SQUAMISH ESTUARY MANAGEMENT PLAN

Land Use Work Group Final Report

February 1981

Government of Canada
Gouvernement du Canada

Province of British Columbia

BACKGROUND PUBLICATIONS

SQUAMISH ESTUARY MANAGEMENT PLAN

Air and Water Quality Work Group
Final Report

Habitat Work Group
Final Report

Land Use Work Group
Final Report

Recreation Work Group
Final Report

Squamish Estuary Draft Management Plan

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Canadian Cataloguing in Publication Data
Squamish River Estuary Management Study
(Canada). Land Use Work Group.
Squamish estuary management plan : Land Use Work Group final report.

Background publication for the Squamish River Estuary Management Study.
Main report based on a study prepared by Robinson Consulting and Associates Ltd. Squamish industrial land value study prepared by Interwest Property Services Ltd. included as Appendix III. Both studies prepared for Ministry of Industry and Small Business Development.
Co-published by Government of Canada.
ISBN 0-7719-8580-0

1. Land use - British Columbia - Squamish region. 2. Squamish (B.C.) - Harbor. 3. Industrial sites - British Columbia - Squamish region. 4. Squamish region (B.C.) - Industries. I. British Columbia. II. Canada. III. Robinson Consulting and Associates. IV. Interwest Property Services Limited. V. British Columbia. Ministry of Industry and Small Business Development. IV. Title.

HD320.S62S62 333.77'1'0971133 C81-092173-1

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PREFACE

The Squamish River Estuary Management Study was undertaken to prepare a management plan for the Squamish Estuary for consideration by the Minister of Fisheries and Oceans for Canada and the Minister of Environment for British Columbia.

A number of technical groups were established to undertake delegated responsibilities. The Land Use Work Group (LUWG) was one of four work groups reporting to the Planning Work Group which, in turn, reported to the Planning Committee.

The Land Use Work Group objectives fall into two general categories: (i) the compilation of existing information on all aspects of commercial, residential and industrial land use in the study area; and (ii) the identification and evaluation of land use policy options and means to resolve land use conflicts in the study area. The first set of objectives was pursued during Phase I of the study; this report is the culmination of that work. The second set of objectives was pursued during Phase II and consisted largely of assisting the Planning Work Group in preparation of the Squamish Estuary Management Plan.

Specifically, Phase I objectives were twofold:

(1) To identify existing land ownership and land tenure in the study area and identify and assess existing land use policies in or affecting the study area to provide a basis for subsequent policy analysis.

(2) To identify and assess existing information regarding: (i) the demand in Squamish and British Columbia for land for industrial and port purposes; and (ii) the existing and potential supply in Squamish and British Columbia of land and related facilities capable of meeting the above demands, in order to provide a basis for determining land uses in the study area compatible with local, provincial, and national social, economic and industrial development and resource management policy objectives.

In order to complete Phase I of the study within the time allotted, the Ministry of Industry and Small Business Development engaged two consulting firms. Robinson Consulting and Associates Ltd. was responsible for an assessment of supply and demand of industrial and port land on the B.C. coast, with particular reference to the possible role of Squamish in meeting projected demands. Interwest Property Services Ltd. examined the suitability of land in the study area for such purposes. The study undertaken by the former comprises the bulk of this report. Minor changes have been made to incorporate data from the Interwest study (see Appendix III), more current information and editorial content.

Constraints, both time and financial, limited the ability of the LUWG to undertake a detailed analysis of existing and proposed or possible land uses. However, the report does provide a broad examination of the anticipated industrial and commercial land requirements in the estuary in the coming years. That information will provide the basic framework for a more detailed analysis of land use by, or in cooperation with, those individuals and firms currently operating within the estuary.

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* These maps are located in the envelope on the inside back cover of this report.

1. SUMMARY AND RECOMMENDATIONS

1.1 Executive Summary

This report focuses on industrial land use. It provides an assessment of the current industrial land use and a projection of potential future industrial land use requirements in Squamish. The supply of, and the demand for, industrial land in the study area is considered within the context of competing alternative provincial sites and the future industrial land use demands stemming from general economic growth within B.C. The Study does not promote a particular industrial development strategy. Rather, the interaction between supply and demand is considered in order to highlight important relationships that should be understood in making industrial land use recommendations.

Through review of the near term expansion plans of existing firms, the factors that may attract future industries to Squamish, and the relative development costs of the land, it was concluded that the study area is favored by port, and port related industries. Port development costs in Squamish are significantly lower than alternative sites in the Lower Mainland and Vancouver Island. Similarly, the development costs of the new Squamish Industrial Park (first fifty acres) is less than the market price of acreage found in competing industrial parks. The price differential in the industrial park is likely sufficient to induce a number of existing firms to relocate from downtown Squamish.

However, the difference may not be significant enough to attract firms from the Lower Mainland. Squamish does not appear to offer significant locational advantages to non-port dependent industries.

Squamish has the greatest locational advantage for forest product related industries, as reflected by the use of the old Mamquam Channel as a log booming and storage area, the Empire Sawmill, and Squamish Terminals' orientation toward pulp and lumber. This advantage arises mainly from two factors: Squamish's location on tidewater and the predominance of forest product shipments on the B.C. Railway. Furthermore, this advantage is not expected to decline in the foreseeable future; hence forest product related industries will continue to dominate the local economy.

Squamish Terminals is operated exclusively as a forest products facility handling commodities from the central interior of British Columbia and small volumes from Saskatchewan. The pulp capacity of the existing facility is nearly fully utilized. If this terminal is to handle the increased pulp shipments expected to result from the added pulping capacity under construction in the central interior, then the facility must be expanded. Squamish Terminals is currently proposing the creation of a second berth and the infilling of approximately 25 acres of marsh land to handle the increased pulp shipments for which it has obtained contracts. In addition, the company has indicated that their proposal allows for the possible development of a general cargo berth. The general

cargo berth would be required for port dependent industries to locate in Squamish.

In reviewing this proposal, the Fisheries and Marine Service are prepared to consider the construction of the additional berth, but are against the infilling of the 25 acres. Although it appears that the proposed expansion could be accommodated on Squamish Terminals' present site, there would be a substantial loss of lumber storage and there would be no room to develop a general cargo berth.

An alternative that might be developed at approximately equal construction cost involves filling an area east of the old Mamquam Blind Channel. This possibility has not been explored with the property owners and is presented only as a concept worthy of further study. Division of the port into two separate components would probably add to the operating costs of the terminal operator and the BCR, but it may prove to be more environmentally acceptable than the Squamish Terminals' proposal.

Although Squamish has been considered as a potential location for a bulk facility to handle coal, sulphur, potash, and grain, such facilities will not be required over the next 10-15 years. The expansion of Roberts Bank and the new port development at Ridley Island (Prince Rupert) appear sufficient to meet provincial bulk port requirements over this period. However,

changes in the composition and foreign market destinations of export commodities beyond 1990 may create a future demand for port facilities that conceivably could be met best by port facilities in Howe Sound. Particular reference is made to possible growth in coal shipments from Northeastern B.C. to European destinations. Prince Rupert is well suited to handle coal traffic to Japan, South Korea and many other market areas but rising fuel costs may reduce its future attractiveness with respect to shipments through the Panama Canal. The BCR is of the opinion that, in the longer term, it could move large volumes of coal at an acceptable freight cost. The BCR could currently handle 79 car (100 ton) unit trains and has a continuing program of curve reduction and other track improvements that will enhance this capability.

Port dependent industries that could potentially locate in Squamish include additional sawmills, a thermo-mechanical pulp mill, or such industries as metallic mineral smelters, steel mills, or metal fabrication plants. These industries could potentially be accommodated in the proposed industrial park. Although the direct land use impacts of these industries are off the estuary, they would have an indirect effect through their demand for additional port facilities.

Because of Squamish's particular locational advantages which will serve to attract port, and port-dependent industries, this study concludes that the key to future industrial land use

demand, both on and off the estuary, is port development. Off estuary port dependent industries will not locate in Squamish if port facilities are not available. The challenge is to accommodate the needs of existing industries while not foreclosing opportunities to accept new industries, and simultaneously satisfying the region's social, economic and environmental requirements. This study has not attempted to determine whether the proposed expansion by Squamish Terminals will satisfy the port demands of potential off-estuary industries. This question should be addressed. However, it is clear that the interdependence of the port facilities and the growth of port dependent industries should not be ignored. Port development must be viewed, and planned for, in the context of the region's overall industrial development.

Expansion of port facilities or improved utilization of existing facilities on the north shore of Burrard Inlet could provide a highly competitive alternative to expansion at Squamish Terminals beyond that currently proposed. On the other hand, demand for additional port-related industrial sites in British Columbia is strong and may shortly exceed supply. An estimated 1,490 acres[1] of land, excluding water areas, is believed to be developable for port and port-related industrial purposes at

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[1] All area measurements in this report are provided in acres rather than the larger hectares (one acre = .404686 ha).

acceptable (competitive) cost in the study area.[2] Additional land north of the study area also appears to be developable for industrial purposes (e.g. Cheekye fan), while sufficient land for expansion of commercial and residential areas is available at reasonable development cost. Despite substantial expenditures required to improve land in the estuary (filling and the provision of basic services), the total cost per acre is expected to be lower than at most other port-industrial locations on the coast, making these sites very competitive on a capital cost basis. It is also important to realize that large parcels of land are becoming increasingly scarce in port areas.

The relationship between land tenure and the incentive to invest in the land is also a critical determinant of land use. Much of the foreshore and adjacent lands are owned by the Crown and the BCR, and are leased for particular uses. The insecurity of tenure associated with some of these leases acts as a detriment to investment and discourages more valuable uses of the land. If more efficient land use is to be encouraged, then the insecurity associated with the current leasing arrangements must be overcome.

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[2] It should be noted that this cost estimate is based on accounting costs, not economic costs which include social and environmental costs.

This study has focused on industrial land use activity while not explicitly recognizing competing land uses. However, development in the study area has been greatly influenced by land use activities to protect other uses, notably the fishery resources. This is particularly apparent in the central area of the Squamish Delta, where flood protection works have been constructed, but industrial development has not been allowed. The potential productivity of this area for the fishery resource and/or industrial purposes appears substantial. Positive direction is necessary to enhance the overall productivity of this area.

In evaluating the future role that Squamish should play in the British Columbia economy, the port-industrial potential of Britannia must also be considered. Britannia presents few environmental constraints for port development, but useable land is believed to be limited to approximately 150 acres. Similarly some 160 acres (gross) at Furry Creek is available for port or industrial purposes although its suitability for either has yet to be determined. However, it should be noted that the relative isolation of these sites may enhance their value for specific industrial purposes (e.g. a Liquefied Natural Gas plant). Therefore, it may be deemed advisable to reserve them for such purposes and restrict general industrial activity to areas already developed.

Although a relatively small port expansion at Squamish (in terms of the percentage of the estuary required) would appear

to meet anticipated needs for at least the next decade, further economic growth should not be precluded by implementing a management system that lacks the flexibility to accommodate industrial and port needs beyond those currently envisaged, should those needs arise. It should be noted that, while this report places emphasis on industrial land use, the need for land for residential and related uses is acknowledged and should be covered by the Community Plan which is presently in preparation.

1.2 Recommendations for Further Research

The following comments on further research are those of the LUWG, on the basis of information supplied by the consultants. While it is recognized that the other work groups, ministries or agencies will be addressing some of these issues in their ongoing research programs, it is the opinion of the LUWG that the optimal management plan cannot be implemented unless additional information pertaining to the various development options is obtained. It is recommended:

- That studies be undertaken in order to properly assess the present and potential biological productivity of each part of the estuary, in order to determine the potential impact of further alienation or specific enhancement/restoration initiatives.

- That a study be undertaken to assess the feasibility of restoring the 35 acre dredge spoil stockpile, adjacent to the training dyke in the Central Delta, to a biologically productive state, to determine the cost of restoration, and to determine if the material could be transported economically to other sites where fill is required.
- That a study be undertaken to assess the relative advantages and disadvantages of proposed port facilities at two locations, adjacent to the northern boundary of the existing Squamish Terminals and on the eastern side of the old Mamquam Channel, in terms of their potential impacts on biological productivity of the estuary as a whole. Analysis of the Squamish Terminals expansion should explore the feasibility and relative costs and benefits of locating additional berthing facilities on either the east or west sides of the development or on both sides. Further, the biological productivity analysis should not be limited to an examination of basic life forms but rather extend to an assessment of probable impacts on salmonid populations in the Squamish River system.
- That industry-port relationships be explored in further depth to determine whether or not the addition of a "common access" berthing facility at Squamish would adequately meet the needs of industry that may be

attracted to the area, as well as the costs and benefits of such development. The analysis should include an examination of modifications to the present Squamish Terminals facilities, new facilities at an expanded Squamish Terminals, and new port development east of the old Mamquam Channel or at Britannia.

- If it is deemed to be appropriate by the other work groups, that a specific cost/benefit engineering study be undertaken to identify, assess, and recommend between the alternative means of rationalizing the handling and storage of logs in the Squamish Estuary. The study should define the operational implications (including the physical and financial implications) of the various options, and include fieldwork to define locations of existing natural or man made features as related to the proposed sort and/or storage options.

2. INTRODUCTION

2. INTRODUCTION

This report focuses on industrial land use. It provides an assessment of the current industrial land use and a projection of potential future industrial land use requirements in Squamish. The study is further narrowed to the consideration of land use by heavy industry, or industries that are basic to the Squamish economy. Such industries characteristically draw primary economic resources from the region, and transform them into a saleable product for marketing outside of the Squamish area. The numerous log storage and booming operations located on the old Mamquam Channel, Weldwood's Empire Sawmill, two chemical plants, Squamish Terminals, and the British Columbia Railway (BCR) are the "basic" industries considered in this study. Although very important to the Squamish economy in terms of income and employment generated, the Western Forest Products pulp mill at Woodfibre is excluded from consideration since the plant site (e.g., land use activity) is outside of the study area.

Future industrial land use has been forecasted in the context of the overall demand for, and supply of, provincial industrial sites that offer locational advantages that are similar to those offered by potential sites in the Squamish study area. The demand for industrial sites and port facilities will be driven by the economic growth of particular resource sectors of the British Columbian and Canadian economies. A number of these

forecasts have been reviewed and the needs of these industries (implied by the economic forecast) have been matched to the particular locational advantages of Squamish, in order to determine the types of industries that may, in the future, be attracted to the Squamish area. It is recognized that industrial sites in Squamish are not unique, and that Squamish will compete with alternative sites in the Lower Mainland, Vancouver Island, the interior, and the north coast. A price structure relating industrial sites in the study area to competing sites elsewhere has been constructed in an attempt to establish Squamish's competitive position.

The extent of industrial development in Squamish will result from the complex interaction of supply and demand. For instance, industrial sites could be offered in Squamish, but because of slow economic growth or uncompetitive land prices the sites may be left undeveloped. Conversely, the supply of industrial sites in Squamish may not expand beyond current levels, but provincial economic growth would continue largely unabated as industries locate elsewhere. It is impossible to predict the eventual outcome of this process, since so many of the factors influencing the results are unknown, or not known with any degree of precision. In fact, the Squamish Estuary Management Plan is an integral part of this process as it affects future land use through its recommended decisions. For this reason, no attempt has been made to predict a particular industrial growth pattern, but rather

to highlight important relationships that should be understood in making industrial land use decisions in the Squamish area.

The establishment of a basic industry will exert secondary land use demands for support industries, residential and expanded commercial areas. These secondary land requirements have not been explicitly taken account of. However, municipal officials consider there to be sufficient vacant land off the flood plain to meet these secondary requirements at development costs similar to existing sites.

3. EXISTING INDUSTRIAL/PORT DEVELOPMENT

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The local economy of Squamish is driven by resource extraction and processing industries that support related industrial establishments and service industries. Light manufacturing establishments do not contribute significantly to the local economy. In this section, the types of basic industries presently located in Squamish are discussed and their locations noted. The expansion plans of these established industries are also outlined. Why these industries chose to establish in Squamish is addressed in the following section. An economic base study of the area has not been attempted since the employment and income significance of the particular industries is not of direct relevance to the LUWG. Rather, the intent of this discussion is to indicate the established industrial land uses and their near term expansion plans.

Forestry related industries dominate the local economy and the industrial land use in the study area. Logs are delivered to the old Mamquam Channel by truck (largely from the Soo Public Sustained Yield Unit which extends from Squamish into the Pemberton Valley, and T.F.L. 38 which encompasses the Squamish River Valley); by water (from the north coast and Vancouver Island); and railcar (from the Fort St. John area). These logs are either processed in the Squamish area by Weldwood's Empire Sawmill (hemlock and balsam species only), the Squamish Shake and Shingle mill and a number of

other small operators, or transported by water to processing plants in the Lower Mainland or Vancouver Island. If the logs are to be delivered for processing outside of the Squamish area, then sufficient water, foreshore and backup land is necessary to dump, scale, sort, bundle or boom, and store the logs until removal. This land use activity is centered along the old Mamquam Channel. The water lots in the Channel are Crown owned and leased to private concerns for a specified time period and lease fee. Presently, seven forest companies hold foreshore leases in the Channel, with Weldwood Canada, Ltd. holding nearly 60% of the leased land area. (Refer to the LUWG maps showing land use and lease information located in the evelope on the inside back cover of this Report.) The use, lessee, lot and area presently under Crown lease in the old Mamquam Channel are summarized in Table 1.

In addition to the water and foreshore area, Weldwood operates a dryland sorting area adjacent to the Channel across from its mill site. This site is also used by CRB Logging Company Ltd. and Squamish Mills as a dryland sort. The companies stated during a survey conducted for this report that the present area is adequate, but of minimal size for their requirements.

The expected future land use requirements for log handling are expected to remain close to today's levels, since the

TABLE 1

STATUS OF CROWN LEASES IN SQUAMISH ESTUARY[1]

(August 1980)

USE	LESSEE	LOTS	WATER LOT AREA (acres)	TOTAL
Log booming and Storage				
	Western Forest Products Ltd.	6117 & 7177	44.47	
	Western Forest Products Ltd.	5619	54.37	
	Weldwood of Canada Ltd	6954 Bk A & B	7.07	
				105.91
Log dumping and storage				
	MacMillan Bloedel	7139	10.94	
	Weldwood of Canada Ltd.	6360	0.35	
	Ogden Lumber Co.	6305 Bk B	0.72	
				12.01
Log dumping and booming				
	Walter D. Magee	6305 Bk A & 6736 Bk A & B	1.46	
	B.C. Railway, sublet to Weldwood	7056	4.48	
	Weldwood of Canada Ltd.	5905	6.40	
	C.R.B. Logging Co.	6931	5.92	
				18.26
Log storage				
	Weldwood of Canada Ltd.	6062 & 6505	21.80	
	L. & K. Lumber	1717 & 7259	2.11	
	Whonnock Lumber Co.	6305 Bk C	0.81	
				24.72
Public boat harbour				
	D.P.W. Order in Council	6329	0.90	0.90
Public boat launch				
	District of Squamish	7106	0.01	0.01
TOTAL AREA				161.81
% forestry related use				99%

1 All other water lots are reserved in favour of B.C. Railway, Crown granted to B.C. Railway, or are vacant. Please refer to LUWG lease map for location of water lots.

(Source: Ministry of Lands, Parks and Housing)

majority of timber is cut from the Soo Public Sustained Yield Unit. This cut is regulated (as in all PSYU's) and the operating companies must cut within certain specified limits. The Soo PSYU is fully committed; hence the cut should not significantly change in the future from present levels.[3] However, it should be recognized that the amount of timber moved through Squamish and stored in the area can vary substantially over time, being affected by weather, markets, salvage contracts, corporate decisions and a host of other factors.

The standard term for a water lot lease granted by the Ministry of Lands, Parks and Housing is ten years. This term is modified upon recommendations from reviewing government agencies and the municipality. Leases in the old Mamquam Channel renewed in 1971 and 1973 run for a ten year period. The ten leases renewed during 1978-79 are for durations of five years (five leases), four years (one lease), three years (three leases) and two years (one lease). All existing leases are up for renewal by 1984. The shorter term leases are a result of municipal and government agency comments, and their longer term objective of reducing log storage in parts of the old Mamquam Channel. However, alternative vacant log storage/handling sites are not apparent. In Howe Sound there are no vacant log storage areas available that are similar in size

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[3] British Columbia Forest Industry: An Overview, Ministry of Industry and Small Business Development and the Ministry of Forests, March 1980, p. 57.

to the old Mamquam Channel area. During the peak storage period (in the fall), there is not enough room in the Sound to accommodate all the logs arriving and some have to be temporarily stored at up-coast locations.[4] Furthermore, the Empire Sawmill, the largest holder of Crown foreshore, is designed to receive logs from the water only. As an alternative to present usage, increased dry land area could be utilized for sorting (not storage). However, dry land sort sites generally require water frontage so that log shipping and/or receiving is financially viable. Since all of the old Mamquam Channel and the adjacent land is held by either the Crown or BCR, there is less incentive for the lessee to invest in developing the property (for example, construction of a dry land sort). Reducing the life of the foreshore lease further reduces the lessee's investment incentives. Without an indication from government agencies of suitable alternatives to the Mamquam Channel for log storage, the companies are placed in a tenuous position. In the survey of industrial users, one respondent made the following point:

> "The Land Use Committee (sic) should be aware of the fact that many dumping and booming grounds presently in use are not developed to the highest possible standards because of the lack of available land and the insecurity

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[4] Howe Sound Overview Study, Environment and Land Use Committee Secretariat, February 1980, p. 71.

of tenure. Land and secure tenure must be available for industry to justify the high cost of development."

The economic basis for the above point is the fact that property improvements are not mobile, but rather are connected to a particular piece of land. Therefore, entrepreneurs are reluctant to invest in developing property unless they either own it outright, or have the assurance that they may lease the property for a length of time sufficient to allow full recovery of their development investment.

The industry survey indicates that certain companies would favour expanding their foreshore areas or moving to the foreshore. Tentative requests were received for an additional 10 to 15 acres of land and foreshore. The most detailed expansion plans were submitted by Weldwood of Canada and MacMillan Bloedel. Weldwood's expansion would develop a booming area at the saw mill yard. MacMillan Bloedel are proposing to establish a landfill area (55 acres of D.L. 5619) for a future dryland sorting area.

It has been suggested by various individuals and groups contacted during the preparation of this report, that a detailed analysis of log handling and storage in the estuary is required. However, because of the complexity of the issue, the Land Use Work Group is of the opinion that it cannot be addressed adequately at this, the background report stage, of the management plan. Should

further analysis of land and water use by the forest industries be required at the implementation stage, the full cooperation of the affected parties should be sought in determining the extent of the problem(s), establishing terms of reference for study, collecting the necessary data on timber movements, and arriving at solutions acceptable to all concerned.

Along the west shore of the old Mamquam Channel are the chemical plant sites of Hooker Chemicals (Nanaimo) Ltd. (Division of Canadian Occidental Petroleum Ltd.) and FMC of Canada Ltd. Hooker Chemicals presently lease 7.44 acres from the BCR with frontage on the dredged tidal channel (Cattermole Creek) that lies between FMC and Squamish Terminals. Approximately fifty percent of the property is developed as a chemical manufacturing facility, producing sodium chlorate solution for use in pulp mills. In 1979, equipment was added to bring the existing plant up to capacity. The company expects a second production line and associated equipment will be added in the future to meet expanding market demands. Such an expansion would occupy most of the undeveloped area of the property. With this expansion, the company expects that it will be necessary to resume chemical barge movements to service the pulp mills located on tidewater. Water transportation was curtailed several years ago because of silting which occurred in the channel. However alternative means of transportation to the affected customer were available; including barge transport via the FMC plant loading dock located at the southern tip of the FMC site.

FMC of Canada Limited leases approximately 65 acres from the BCR, of which about 50% is currently utilized as a chemical plant site. FMC has three barge slips, one for receiving salt and two for shipping product. The company has no immediate expansion plans and does not anticipate the need for additional land or barge slips. FMC's chlor-alkali plant, using the mercury cell process, began production in 1965. In 1970, unnaturally high levels of mercury were found in seawater and mud flat sediments. Because of this, the Federal Minister of Fisheries and Oceans closed the upper Howe Sound to commercial and sport fisheries for crustaceans and all fishes except salmon (sport fishing), trout and herring. The closure was in effect from 1970 through 1978. Immediate steps were taken to reduce the output of mercury from the plant to acceptable levels. With in-plant recovery methods, mercury discharge levels have been reduced to a point well below standards established by the Department of Environment. However, it is thought that considerable quantities of mercury still remain in the sediments. (See the Air and Water Quality Work Group (A & WQWG) Report).

The level of mercury in sediments and the biota has been studied periodically since 1970. A fuller discussion of these studies is contained in the A & WQWG Report. In general, the highest mercury concentrations were found in sediments to the south and east of the plant for about two km. Cores taken in the Mamquam Channel showed relatively low mercury east-west line along the Squamish River delta west of the plant showed an increase in

mercury with proximity to the plant. The highest mercury concentrations have been found just south of the plant loading dock (in 1972). A comparison of 1972 survey results with those of 1976 indicate that mercury levels in sediments from the contaminated area were for the most part unchanged, although levels near the plant dock appeared to have decreased slightly.

The principal implication of these studies is that dredging and related disturbances in the course of further industrial development could again release large quantities of mercury presently bound up in sediments. Core samples indicate that the mercury is present in a relatively thin layer found in the first twenty centimetres of the bottom sediments. The prop wash from barges using the FMC barge slips and the ships at the Squamish Terminal's berth likely re-suspend the bottom sediments so that it is unlikely past mercury deposits are being buried by subsequent sediment deposition in this area. Recent studies have suggested that a large portion of the mercury buried in the sediment becomes inert. Furthermore, observations from the ocean dumping of mercury bearing sediments indicate that substantial quantities of mercury remain suspended in sea water for only short periods (i.e., a few hours). For these reasons, the impact of dredging in this area and the release of mercury may not be as severe, or as long term, as previously considered. However, further study is required to resolve this issue. It is assumed that if any dredging were to occur, it would be closely monitored and the appropriate dredging

technique would be employed. The use of the dredge material for fill would likely not pose a substantial hazard if it were covered and erosion of the material was minimized.5

In a recent communication from the Fisheries and Marine Service of Environment Canada to Squamish Terminals, the Service stated that they were prepared to further consider the construction (i.e., dredging) of a berth on the east side of the existing terminal.

Squamish Terminals presently lease a 42 acre site from the BCR. The terminal has been operating since November, 1972, and specializes as a forest products terminal. Over the past seven years the annual cargo volumes have been as shown in Table 2.

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5 Personal communication from Dr. J. Thompson, Institute of Ocean Sciences.

TABLE 2

SQUAMISH TERMINALS ANNUAL CARGO VOLUMES

(1973-1979)

YEAR	LUMBER (million bd. ft.)	CAPACITY UTILIZATION[1] (lumber capacity)	PULP (tonnes)	CAPACITY UTILIZATION[2] (pulp capacity)	VESSELS ARRIVING
1973	58,126	24%	241,159	51%	76
1974	40,348	17%	308,325	65%	74
1975	54,752	23%	329,389	70%	83
1976	52,145	22%	372,250	79%	89
1977	50,616	21%	435,028	92%	92
1978	34,169	14%	448,298	95%	73
1979	30,928	13%	458,056	97%	84
					571

1 Lumber capacity computed as two million board feet storage capacity per acre, ten acres of existing capacity with a turnover rate of one per month. The rated capacity is 240 million board feet per year.

2 Pulp capacity was determined by assuming a 1.5 turnover rate/month on warehouse pulp storage capacity of 26,300 tonnes. The rated capacity is 473,400 tonnes/year.

(Source: Squamish Terminals Ltd.)

The destination of products passing through the terminal is Japan/Korea (60%), Western Europe (30%) and the Mediterranean (10%). The terminal is designed to receive pulp and lumber from the BCR and also has a barge slip for receiving coastal shipments. The terminal serves the interior pulp and lumber mills along the BCR route including B.C. Forest Products, Finlay Forest Industries (both in Mackenzie), Northwood and Prince George Pulp and Paper (in Prince George) and Cariboo Pulp (in Quesnel). The terminal receives pulp from Prince Albert Pulp and Paper Ltd. of Saskatchewan via rail from Vancouver. Squamish also receives periodic shipments of pulp from Gold River and Woodfibre for transshipment.

The terminal's warehouse, which is specially designed for the off-loading and storage of pulp, offers 160,000 square feet of covered storage and is the largest of its type in Western Canada. However, the terminal is rapidly approaching full capacity utilization as indicated in Table 2. The Terminal's forecast of future pulp shipments through the facility is presented in Table 3.

TABLE 3

SQUAMISH TERMINALS FORECAST OF FUTURE PULP SHIPMENTS

(1980-1987)

YEAR	PULP (TONNES/YR)	NUMBER OF SHIPS[1] (PER YR.)
1980	508,000	112
1981	543,300	120
1982 thru 87	907,200	200

[1] assumes the same average loading per vessel as in the period 1973 through 1979.

(Source: Squamish Terminals Ltd.)

The growth in pulp shipments during 1980 and 1981 is the result of an expected strong overseas pulp market and a relatively weak domestic lumber market. That is, the increased production derives largely from increased capacity utilization of pulp mills rather than capacity additions. Although these expected volumes exceed the facility's rated capacity, the Terminal Manager feels that they can be handled over the short term. The significant boost in throughput beginning in 1982 is from the new capacity added by three pulp mills served by the BCR and currently under contract with Squamish Terminals (Northwood, Finlay Forest

Industries and Cariboo Pulp), and the new thermo-mechanical pulp mill expected to commence operations at Quesnel in late 1981 or early 1982. For the most part, these forecasted volumes are relatively certain since construction work is currently underway and on schedule. Because Squamish Terminals has shipping contracts with these mills, it is expected to capture the additional volumes. Whether Squamish Terminals will in fact handle the full volumes depends, in part, on the destination of the pulp and its ability to provide the service.

The facility's present capacity is not adequate to handle the expected pulp volumes after 1982, and Squamish Terminals Ltd. is currently proposing the construction of a second berth, north of the existing berth, on the east side of the terminal. See Map I. The conceptual plan of the new berth would require dredging to a depth of 38 feet below low water, the addition of a new 160,000 square foot warehouse, and the creation of 25 acres of back up land for lumber storage (to make up for the area lost by the new warehouse). The total cost is estimated to be in the order of $12,070,000 (1980 dollars), as indicated in Table 4, below.

MAP I

PROPOSED SQUAMISH TERMINALS
EXPANSION SITE

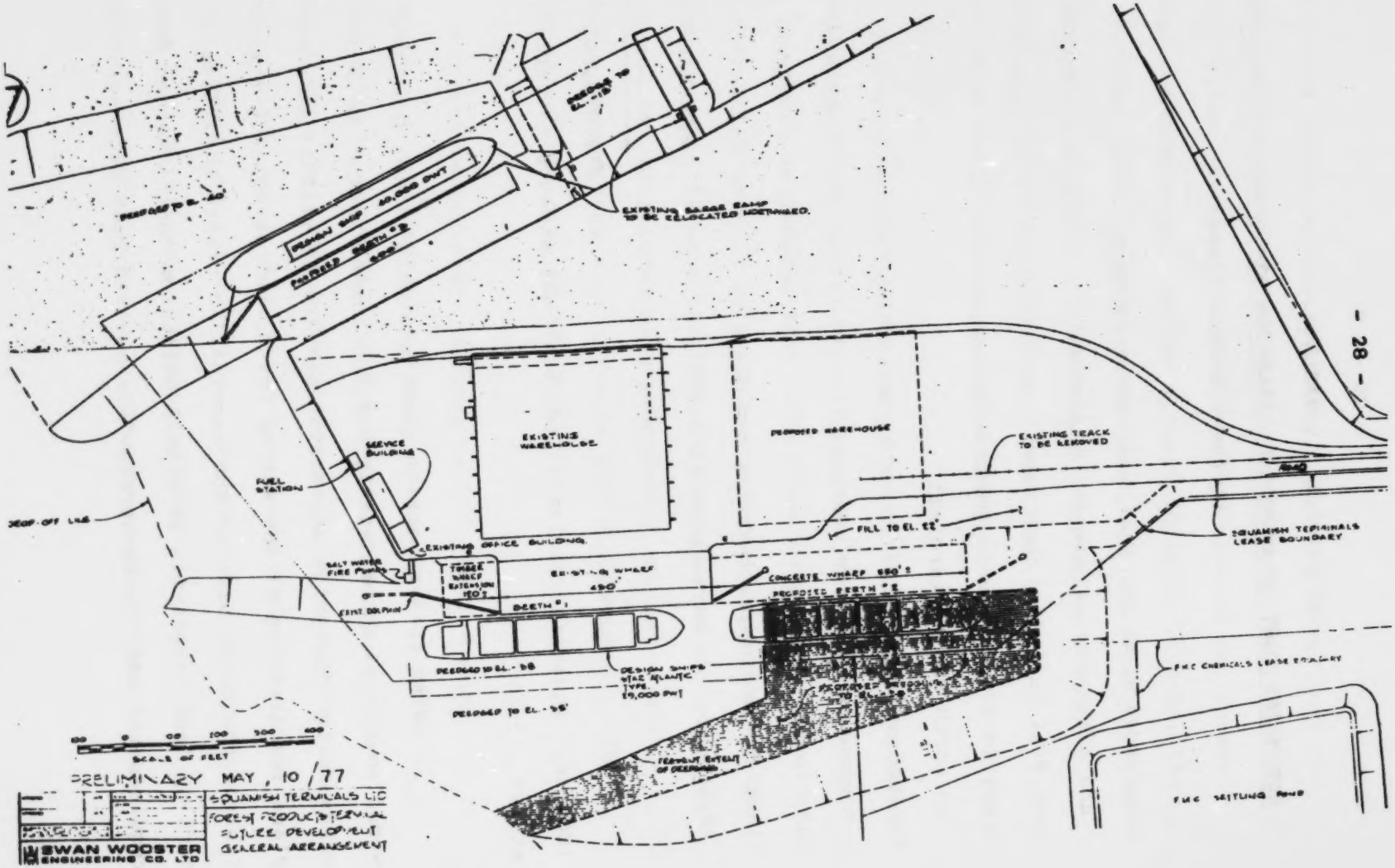

TABLE 4

ESTIMATED COST OF PROPOSED EXPANSION BY SQUAMISH TERMINALS LTD.

(current 1980 dollars)

Construction of 550 foot long concrete wharf and extension of present timber wharf	$4,400,000
Land fill including bulk head	600,000
Dredging 500,000 cubic yards and pumping to north end of terminal	1,000,000
Warehouse (400 x 400) including electrical, mechanical and site services	4,000,000
Addition rail services	70,000
Blacktop, drainage, lighting and fire system for 25 acres plus 10 acres	2,000,000
TOTAL	$12,070,000

(Source: Squamish Terminals Ltd. with adjustments to reflect their stated plans)

With this expansion, the Terminals' total pulp capacity would double to approximately 946,800 tonnes/year. As noted earlier, the Fisheries and Marine Service is willing to consider plans for dredging of the second berth, but is against the proposed fill on the north side of the terminal to create the 25 acres of back-up land. Squamish Terminals maintains that a second berth requires the additional acreage for covered pulp storage in order

to keep existing lumber storage capacity. Judging from the schematic plan, the second warehouse could be accommodated on the existing site. However, a substantial portion of the lumber storage area would be lost. Before a final decision is made, the value of the land in its present state (fish and waterfowl habitat) and as a filled area should be determined. Information with respect to the relative significance of this land in its alternative uses would help guide decision-makers.

Squamish Terminals note that a third berth could be added on the west side of the existing facility to handle general cargo from the interior, or perhaps from industries locating in the proposed industrial park in Squamish. The incremental cost of the third berth is small because the area is already dredged to a depth of 38 feet and the additional site preparation costs are small (assuming the second east side berth is also constructed). The total cost is estimated at $3,530,000.

The British Columbia Railway is the final, heavy industrial user identified in the study area. Besides being a major landholder in the area, the BCR operates a company stores and repair facility. The company operated a railcar assembly plant and a car repair plant until 1977, when the assembly plant was shut down after producing 1,400 vehicles. The plant was put up for sale through the B.C. Development Corporation. It was listed for approximately 18 months before the BCR requested, in April 1979,

that it be removed from the market. The assembly shop, with its specialized machinery, attracted only those industries in need of its specific tooling. The Company's current plans are to convert the inactive car assembly plant into a car repair plant, and convert the existing car repair plant to company stores. The company's long term plans include the possibility of moving the existing railyard out of North Vancouver to Squamish. The tentative site of this expansion is south of the existing yard.

The BCR also influences industrial development in Squamish by its rail movements. A discussion of the BCR's 1980 traffic forecast is presented in Appendix II, giving the commodities/traffic originating, terminating, and passing through Squamish.

Adjacent to the BCR yard is a 245 acre parcel recently acquired by the Municipality for development as an industrial park. The development plans for this site have not been finalized, but the current conceptual plan is to border the park with a 200 ft. buffer zone along the north and south ends. Approximately 55 acres are dedicated to roads and lanes, leaving roughly 190 acres of potentially developable land. The parcel is connected to the municipal water system.

A small portion of the acreage within the proposed industrial park is privately held, and land assembly is currently

underway. The private land is not purchased; rather the Municipality assumes the rights to the parcel while agreeing to return equal acreage, less development costs, to the owner elsewhere in the park. The BCR currently owns approximately 21 acres on the east margin of the park along the rail-lines. The Municipality agreed in acquiring this land that "rail oriented" industries will be given preference. A rail orientated industry is one that either receives, or ships its goods by rail. An export orientated industry that moved its product the short distance to Squamish Terminals would not be considered rail oriented.

The Municipality has received a number of inquiries from industries interested in locating in the proposed park. These inquiries are generally from local light industrial users (moving and storage, scrap metal yards, waste oil shops, broadcasting company) who are currently operating from existing establishments, but may prefer relocating to the park. The eventual site development costs will play a crucial part in determining how many of these firms will relocate in the park once it is established.

4. DEMAND FOR INDUSTRIAL LAND

4. DEMAND FOR INDUSTRIAL LAND

The demand for industrial land in Squamish will arise from the general economic growth of the provincial economy coupled with the particular locational advantages of Squamish relative to alternative locations. In this section, Squamish's locational characteristics are first addressed followed by a discussion of the effect of general economic growth. A discussion of the price of industrial land in Squamish relative to alternative sites is provided in section 5, Supply of Industrial Land. Here, the advantages and disadvantages of Squamish are identified, and the types of industries that would be attracted to this particular bundle of attributes are suggested. The order in which the attributes are listed is not of significance, since industries will differ as to the importance of each characteristic depending on their particular requirements.

4.1 Advantages

4.1.1 Transportation Links

Squamish is serviced by the British Columbia Railway, Provincial Highway 99, water access and deep water port facilities. The former two transport links between Squamish and the Lower Mainland were established relatively recently, with the rail access opened in 1956 and Highway 99 opening two years later.

The BCR links Squamish directly to the Central and Northern Interior of British Columbia and indirectly (via the two national railroads) to the rest of Canada and the U.S.A. The majority of rail traffic moves south on the BCR line, carrying logs, lumber, pulp, paper, woodchips, sulphur, mineral concentrates, and grains. This rail link offers industries located in Squamish access to raw and semi-processed commodities from the Interior and/or access to interior markets for the sale of finished products. On the other hand, rail dependent industries may view the BCR link as being relatively riskier than alternative sites in the Lower Mainland served by CN & CP Railways. This risk factor relates to the probability of rail outages due to physical factors (i.e., mud and snow slides) as well as stoppages due to labor/management conflict. Work stoppages over the years may have to some degree damaged BCR's reputation for providing continuous service. As a rule, the economics of rail transport tends to favor large-bulk, relatively low-value commodities. Hence the southern flow of commodities will predominate in the foreseeable future.

The water links and port facilities complement the rail access available in Squamish. As noted earlier, logs are offloaded in Squamish, formed into booms and transported by water to processing points on the Lower Mainland and Vancouver Island. The BCR and Squamish Terminals combine to provide access to offshore markets for the Interior forest products companies.

The combination of the two transport modes will tend to attract port (i.e. terminals) and rail/port related industries. These kinds of industries include export oriented, resource processing industries such as sawmills, pulpmills and other wood processing industries.

It must be noted that, although Squamish is the first point of marine access for commodities moving south on the BCR line, the freight rates on goods delivered in North Vancouver (to industries locating on BCR land) are the same as in Squamish. However, commodities delivered to the BCR in Vancouver for transshipment to Squamish are subject to fixed switching charges which result in a relatively expensive fare for the short haul to Squamish. The assymetric effect of this pricing policy removes any advantage to locate in Squamish in order to reduce rail transport costs.

Highway 99 links Squamish to metropolitan Vancouver in the south and the agricultural, forestry and recreation areas of Pemberton and Whistler to the northeast. The highway link is relatively less important as a conduit for commodity flows between Squamish and Vancouver for heavy industrial users located in Squamish. It is an important link for support industries and service industries in Squamish since many of the finished goods arrive in Squamish by truck from the Lower Mainland.

For light manufacturing industries intending to market their products in the Vancouver area, the 60 km distance between the two centers will represent a significant obstacle. Their products would be delivered by truck, since the BCR generally cannot offer competitive rates over such a short distance. In order to attract industries to Squamish that have Lower Mainland orientation, significant cost savings must be offered (i.e., lower land costs).

For the heavy industrial users considering Squamish, Highway 99 links Squamish to the large labour pool to the south. This is important to the industries requiring a relatively large labour force (greater than 100) and ones that typically experience high labour turnover rates. Similarly, potential employees may prefer to live in Squamish and enjoy ready access to the service base of Vancouver, rather than accept an employment opportunity in a more remote area. However, travel between Squamish and Vancouver is becoming less easy because of increasing traffic volumes on Highway 99. Traffic volumes now average over 5,300 vehicles per day and summer volumes reach 5,800 vehicles per day on weekends.[6] The Ministry of Transportation and Highways has an on-going program for eliminating substandard sections, i.e., replacing wooden bridges with permanent structures and constructing passing lanes. In 1979, a by-pass of Squamish was opened eliminating the mixing of

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[6] Howe Sound Overview Study, op. cit., p. 45.

local and through traffic. The current rated capacity of Highway 99 is approximately 7,100 vehicles per day. This level is expected to be reached by about 1985, although major developments at Britannia, Squamish and Whistler could bring the highway up to capacity at an earlier date. Further capacity expansions would require either four laning the highway (involving extensive realignment) or construction of an alternative route via either the Capilano or Seymour River Watershed.

Although Highway 99 is considered as a positive feature for attracting potential industrial development, once highway congestion exceeds tolerable limits, industries depending on this highway link to Vancouver will view Squamish less favourably.

4.1.2 Energy

Squamish is located on one of B.C. Hydro's major power transmission corridors. The sub-station at Cheekye, approximately 11 km north of Squamish, is a potential source of electricity for electricity intensive industrial facilities. Such facilities include thermo mechanical pulp mills, newsprint mills, and metallic mineral smelters. Currently, Squamish is not serviced by natural gas. However, a proposal to link Squamish to the provincial natural gas system is under preliminary consideration by the provincial government. The absence of a natural gas link precludes Squamish as a location for those energy intensive industries that

require natural gas as a feedstock (e.g., petrochemical industries) or for which natural gas is the most economic fuel source (e.g., cement manufacturing).

4.1.3 Established Community/Attractive Living Environment

Locating a plant in an established community like Squamish offers several important advantages. First, much of the infrastructure and service base is already established. This would generally reduce an industry's initial capital outlay for community services. Secondly, the range of services available to potential employees is sufficient to have a beneficial effect on labour turnover. (Labour turnover is a complex phenomenon which results from a number of factors related to work and living environments. On the basis of labour turnover studies, the range of services available in Squamish is considered to be sufficient to encourage labour stability.)

From the employee's perspective, Squamish is well situated, close to both a broad range of outdoor recreational opportunities and the urban ammenities of the metropolitan Vancouver area. Although not specifically addressed in this study, municipal officials confirm that substantial areas of vacant residential land exist for future expansion at servicing costs similar to the existing subdivisions.

4.2 Disadvantages

4.2.1 Distant Markets

Industries that are market oriented rather than resource oriented, and which have final markets in the Lower Mainland, would face a competitive disadvantage locating in Squamish relative to alternative sites in the Lower Mainland. This disadvantage derives from the fact that freight rates for most commodities are proportionately greater for short hauls due to fixed loading and unloading charges (and, in the case of rail transport, switching charges). Similarly, industries with final markets located in the Interior of B.C. and served by the BCR would more likely locate at Interior sites rather than Squamish, since it is generally more expensive to transport finished products, than raw or partially finished goods by rail. However, in the case of market oriented industries with distant final markets, the freight rate differential between Squamish and the Lower Mainland would be minimal.

4.2.2 Lack of Support Facilities

Squamish's existing economic base does not have the broad range of industrial supply and service establishments required to support a diversified manufacturing base. Such support facilities include tool and die works, heavy machinery sales and service, and

warehouse and storage facilities. Although the potential for the development of these kinds of firms exists in Squamish, Vancouver industrial sites presently offer a clear advantage over Squamish for industries requiring extensive industrial support facilities.

4.2.3 Land Use Constraints

Since 1972, port and industrial development has been confined by government regulation to portions of the Squamish River Delta which do not contribute significantly to estuarine productivity. The federal Department of Fisheries and Oceans has subsequently defined these portions of the delta as:

- that portion north of old Mamquam Channel north-easterly of the public docking site
- areas enclosed by flood control dykes
- where dykes are not present, all areas above extreme high tide mark and to be separated from this demarcation by site-specific green belt area
- shorelines on both east and west sides of Howe Sound South of the Squamish delta.

This directive has, in effect, constrained additional development to the old Mamquam Channel, which has traditionally served as a log dumping and storage area. Although the land adjacent to the Central Basin (approximately 600 acres) appears extremely attractive for port/industrial development, it has remained vacant. (See Appendix III, page 21). The existing land use

constraints on this area are, in large measure, the reason that it has not been developed.

In addition to these direct effects, the land use constraints introduce a degree of uncertainty outside of the immediate area. As noted earlier, the insecurity of tenure on water lot leases reduces the investment that lessees are willing to commit to development of the land. Also, for industries that depend on port facilities, the uncertainty as to whether further port facilities will be added in Squamish serves to significantly reduce the attractiveness of the area.

4.2.4 Harbour Characteristics

The harbour of Squamish does not offer suitable anchorage for large ocean-going vessels. At the present time, vessels calling on Squamish Terminals usually anchor in English Bay in Vancouver to await loading. Squamish Terminals is capable of handling ships up to 45,000 dwt (38 ft. low-water berth depth). If Squamish Harbour was to accommodate large bulk carriers, in the range of 100,000 to 200,000 dwt, extensive dredging to a depth of up to 50 ft. would be required in the delta area. Several informed sources including the Manager of Squamish Terminals concede that a vessel of this size would have difficulty turning at the head of Howe Sound.

4.3 Types Of Industries That Could Potentially Locate In Squamish

In the previous section, the locational advantages/disadvantages of Squamish were considered from the point of view of an industry selecting a plant site. As noted earlier, the municipality's existing economic base is made up of transport, primary extraction and processing industries. In reviewing the locational advantages of Squamish, the evolution of such an industrial base is not surprising. Squamish is a focal point for flows of raw materials (primarily forest products and chemicals) via rail, road, and water. Economically developable industrial land, energy, and labour have promoted Squamish as a location for further processing of these raw materials. Support industries have grown up to serve the local needs of industry and the resident population, but the distance to Lower Mainland markets is apparently too great to allow them to be competitively served from Squamish. Furthermore, there is no indication that these factors are likely to change materially in the foreseeable future. Hence, it is expected that Squamish will remain a location favored by export oriented, resource processing industries, and those industries which manufacture products that can be shipped economically to final markets by water or rail.

The industries that could be attracted to Squamish have been categorized by their land-use requirements into the following three categories:

1. port/waterfront industry;
2. port related/non-waterfront;
3. non-port/waterfront industry.

Support industries that may develop to service the primary industries suggested here are assumed to be located on non-port/non-waterfront land. The list of industries is not intended to be exhaustive, but rather to suggest the kinds of industries that might be attracted to the Squamish area.

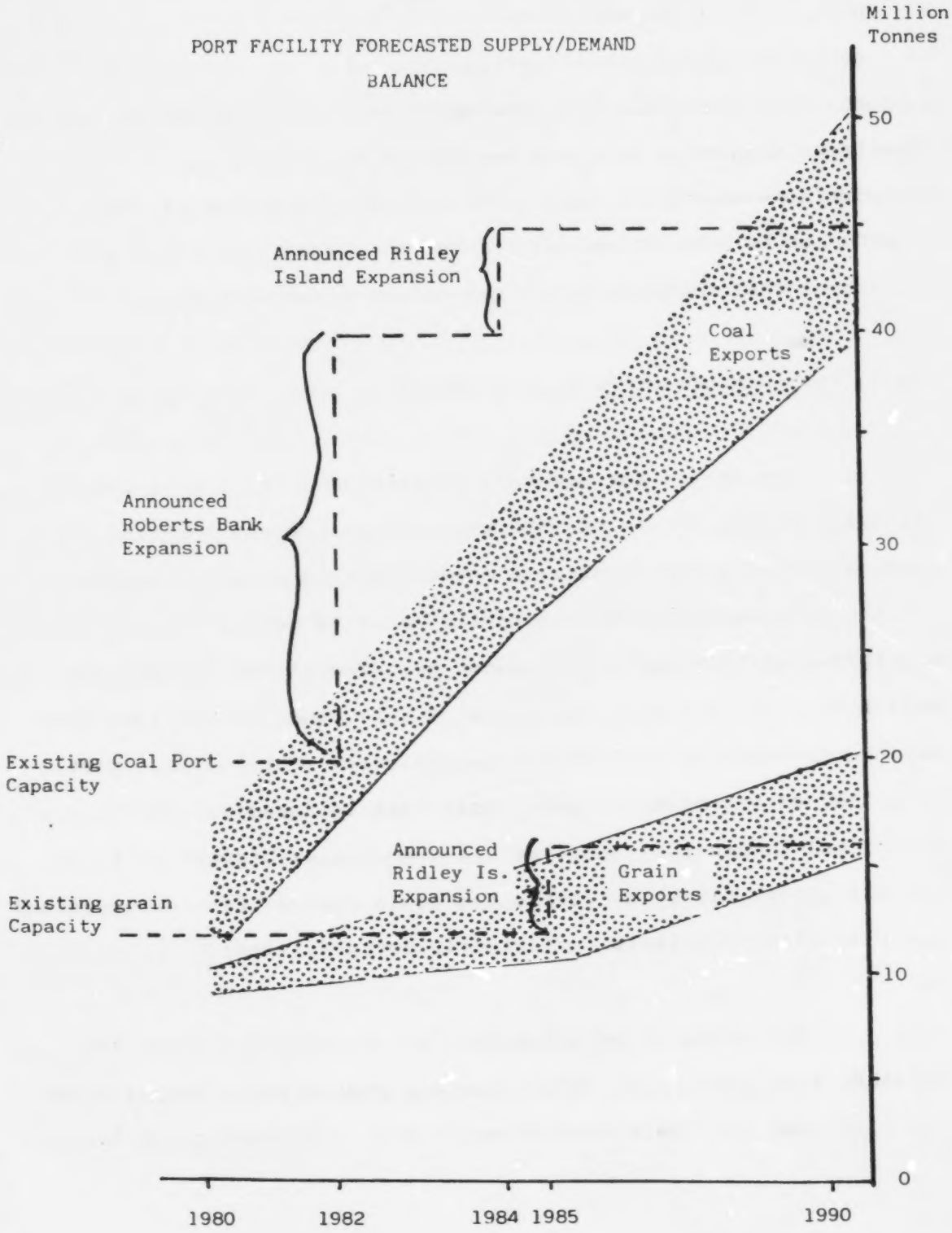
4.3.1 Port/Waterfront Related Industries

The demand for new port facilities in B.C. will depend primarily on the growth of exports, and the present capacity of terminals on the west coast. A major study is currently underway for the federal Department of Public Works to determine the supply/demand balance of west coast port facilities through the year 2000. It is beyond the scope of this study to consider this balance in anything more than a general way. For the most part, potential export-oriented port facilities in Squamish will be restricted to handling the types of commodities brought south on the BCR line. Competing port sites would include Prince Rupert and Lower Mainland Terminals (principally Burrard Inlet).

Forecasts of selected provincial commodity flows and existing west coast port capacities are presented in Graphs I and II. Included are the announced major port expansion plans for

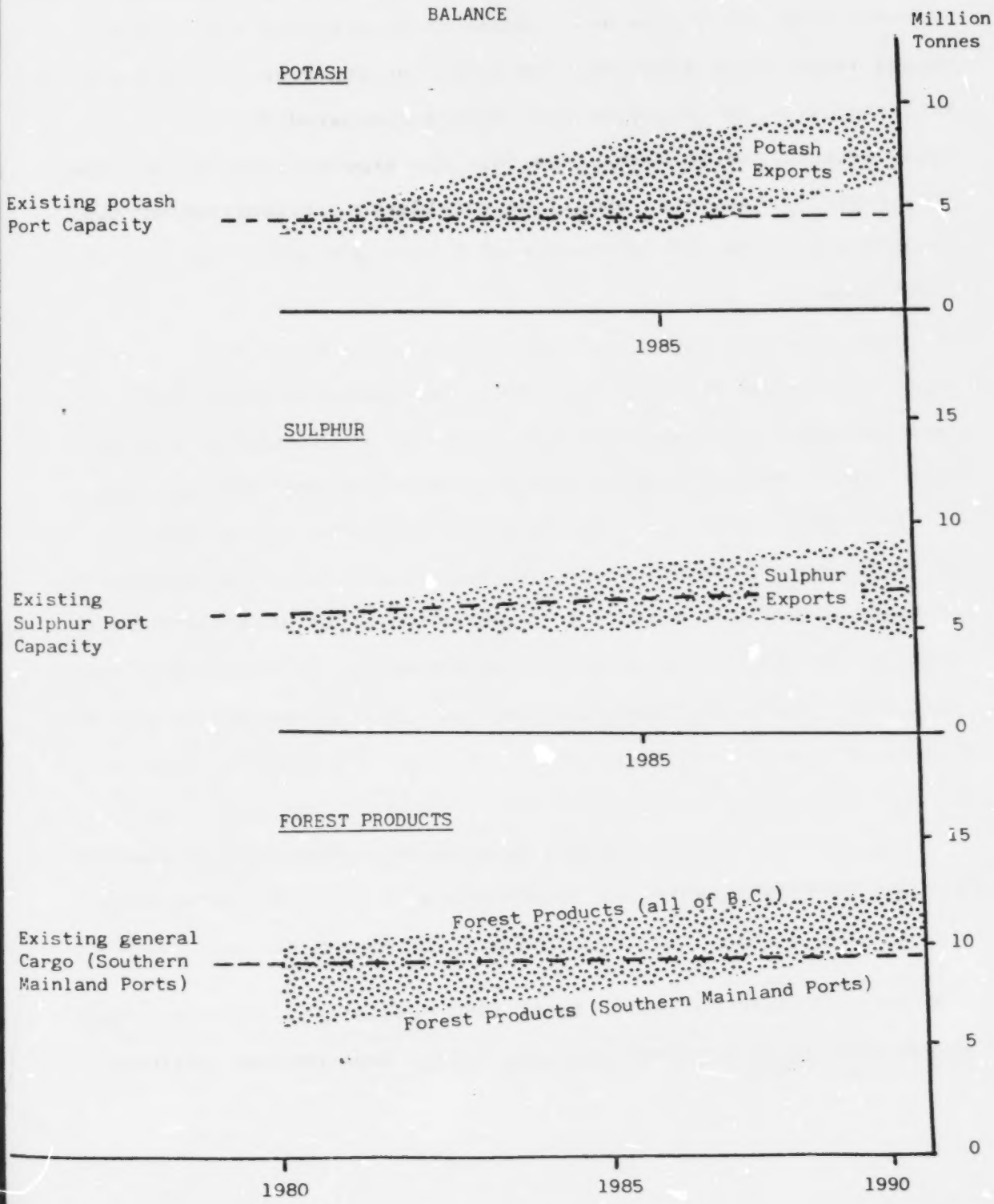
GRAPH I

PORT FACILITY FORECASTED SUPPLY/DEMAND BALANCE



GRAPH II

PORT FACILITY FORECASTED SUPPLY/DEMAND BALANCE



Roberts Bank and Ridley Island. The export forecasts were drawn from a compilation of forecasts (from industry and government sources) prepared by Westac.[7] These forecasts fall within the ranges shown. The assessment of port capacities are preliminary estimates from the study currently being prepared for the Department of Public Works. Neither the export forecasts nor the port capacity estimates should be considered precise; rather the general trends may be indicative of future port capacity requirements.

In the early 1970's, BCR considered the feasibility of locating a bulk port in Squamish to handle coal, grains, and other bulk commodities as well as forest products.[8] The proposal was not favored by government agencies due to concerns over the potential impact on the estuary's marine resources. In the present context, with the announced port expansion plans at Roberts Bank, near Delta, and Ridley Island (Prince Rupert), an additional bulk port at Squamish or elsewhere does not appear necessary in the near future (i.e., ten years).

Other factors mitigating against a coal port at Squamish are the necessary upgrading of the BCR line to handle unit trains

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[7] Westac, "Update to 1990", April 1980 Newsletter, Vancouver, B.C.

[8] Squamish Delta Port and Land Use Study, Swan Wooster Engineering Co. Ltd., 1970.

(although this will diminish over time as improvements continue) and physical limitations of the harbour.

Although west coast grain capacity appears sufficient with the announced expansions at Prince Rupert, there is a continuing interest in Squamish as a grain port. The Hall Commission recognized Squamish's potential as a grain port site in 1972:

> "Congestion on Burrard Inlet and environmental considerations may compel the establishment of a modern grain export terminal outside Vancouver, in which case Squamish could well be the first choice."[9]

The Palliser Wheat Growers Association have shown an interest in locating a grain terminal at Squamish. They cite the inadequate rail and handling facilities in Vancouver that limit the producers' access to off-shore markets. The terminal tentatively envisaged by the Association would have a storage capacity of 10 million bushels of grain, and occupy roughly five to ten acres. However, the potential terminal would require a 33 mile rail link between Ashcroft and Clinton to assure the economic transport of grain. No current cost estimates are available for the construction of this

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[9] Grain and Rail in Western Canada, The Report on the Grain Handling and Transportation Commission, Hall Commission, Ottawa, 1977.

link, but it would be relatively expensive because of the terrain over the prospective route. Operating costs would also be high because of the adverse grades encountered. It should be noted that at the Western Economic Opportunities Conference in Calgary of July 1973, British Columbia and the Government of Canada tentatively agreed to share the cost of the project, but this agreement has never been acted upon. The rail link would not necessarily ensure a grain terminal in Squamish since the grain could continue moving through Vancouver with the empty cars looped through Squamish back to Ashcroft leaving the Fraser Canyon rails for southbound grain only. An alternative site also favored by the Association is Roberts Bank.

Existing sulphur port capacity is likely sufficient to meet export requirements over the next ten years. Moreover, some forecasts suggest that existing capacity is sufficient through to the year 2000. For potash, it appears likely that new facilities will be required toward the latter half of the 1980's (Graph II). This increased capacity will be met largely by the expansion of existing terminals, such as Vancouver Wharves and Neptune Terminals. Additional potash handling facilities will likely be located in the Lower Mainland area as it is served by the national railroads (which deliver all of the potash).

Exports of forest products (logs, lumber, pulp, paper and newsprint) are anticipated to increase steadily over the forecast

period. Port capacity for forest products was not available separately, but is included in the assessment of general cargo port capacity. Although general cargo capacity appears sufficient over the period, the study being prepared for the Department of Public Works suggests that there may be some difficulties in meeting the needs of specialized cargoes, like pulp.

The expansion plans of Squamish Terminals to meet the anticipated growth of pulp exports has already been presented. Given the capital facilities in place and the orientation of the BCR to lumber and pulp, Squamish's comparative advantage as a port facility is in forest products. Presently, there is neither the requirement, nor is Squamish Harbour particularly suited for, a bulk port facility.

In direct competition with Squamish Terminals for pulp shipments from the BCR are Vancouver Wharves and Lynnterm (Port of Vancouver), in Burrard Inlet. Vancouver Wharves maintains two of its five berths for pulp and paper loading, both of which are presently under-utilized. The pulp and paper is handled from rail and truck and is placed in a covered warehouse, which has a total storage area of 14,600 M^2 (Squamish Terminals' present warehouse has an area of 14,880 M^2). In 1979, the terminal shipped nearly 500,000 tonnes of pulp and paper. On the basis of the existing berth space and available back-up land, a terminal official estimated that ultimate pulp and paper capacity could exceed one

million tonnes per year. Two other significant points to note are that freight rates are the same on interior pulp delivered to either Squamish Terminals or Vancouver Wharves, and that Star ships have in the past shipped through Vancouver Wharves.[10]

Pulp is delivered to Lynnterm after switching from the BCR to CN, thereby incurring a small switching charge. Lynnterm was opened in 1976 by the Port of Vancouver to serve primarily as a terminal for exports of forest products. The terminal has a continuous concrete berth face which provides room for up to four typical forest products ships. The facility is on 67 acres of reclaimed land and is served by a loop track plus back-up spurs and dock face rail. The main warehouse is approximately 10,000 M^2 and there is substantial area on site for warehouse expansion. Only about one third of the warehouse area is reserved for pulp while the remainder is used for plywood storage.

Other terminals handling pulp are the Seaboard International Terminal and Centennial Pier. However, neither of these terminals is likely to be competitive for pulp delivered by the BCR, because Seaboard is principally a lumber terminal and Centennial Pier is poorly located (southern shore of Burrard Inlet).

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[10] Star Shipping (Canada) Ltd. is the sole owner of Squamish Terminals.

In addition to port facilities that require waterfront land, at least two sawmills and two pulpmills have expressed an interest in Squamish. Although tidewater frontage is not an integral requirement for these industries (as it is for a port development) it is often preferred for the receiving of raw materials and the shipping of products. The land requirements for the sawmills were stated as between 75 and 100 acres, while the pulpmill's were approximately 150-200 acres. One potential site for these developments may be the presently filled area, west of the Central Basin, adjacent to the training dyke. A thermo-mechanical pulp mill would be particularly suited for locating in Squamish because large quantities of electricity are available. Doman Industries considered Squamish as a possible site for a thermo-mechanical pulp mill, but appear to have selected a site on Vancouver Island. L & K Lumber also considered Squamish as a site for their new sawmill, but have instead selected a site near Langdale. That location is relatively more expensive because logs delivered to Squamish must then be transported to Langdale. The Langdale site was preferred because the company owned the land (as opposed to a lease in Squamish) and the land use constraints, while severe in Langdale, did not halt development.

Although it cannot be classed as an industrial use, the Squamish Yacht Club facilities and adjacent public wharf area on the west bank of the old Mamquam Channel constitute a legitimate demand for waterfront land in the Squamish Estuary. It is

recognized that the present area is inadequate to meet current needs, and demand for boating facilities is expected to rise substantially. The Squamish Yacht Club has requested a long term lease on water lot 6329 but, because of industrial hazards and congestion, the best solution may be relocation to a larger site elsewhere in the estuary or on the east side of Howe Sound.

4.3.2 Port Related/Non-Waterfront Related Industries

Industries in this category would require port facilities for offloading raw materials and/or shipping finished products to offshore markets. Pulp and newsprint mills are included in this category, particulary thermo-mechanical pulp mills and newsprint mills which are export oriented and whose process is very energy intensive. Other industries in this category include metallic smelters (copper, aluminum), an electric arc steel mill, and metal fabrication plants.

These types of industries could be accommodated in back-up lands, such as the new industrial park, with port access via BCR or road. The land requirements for smelters, steel mills and forest product mills are in the order of 100 - 200 acres per plant. Although for the industries in this category direct land use impacts are off the estuary, they would have an indirect effect through their demand for additional port facilities.

It is assumed that any new industry choosing to establish in Squamish will satisfy all the environmental regulations, notably the effluent and air emission standards. Steel mills, smelters and the like, are generally considered to have relatively large particulate emissions to the atmosphere. The potential effect of industrial activity on ambient air quality is fully considered in the Air and Water Quality Work Group Report, but the following points are relevant here.[11] There is a lack of detailed meteorological data for this area so it is difficult to assess the capacity of the Squamish Valley to accept additional air emissions. The area does experience strong winds much of the time from the north or south and these provide good horizontal dispersion. However, temperature inversions, which occur quite often, limit vertical mixing. Relative to many interior valley locations (i.e., Trail, Kamloops, and Prince George) the Squamish Valley is better able to disperse pollutants.

4.3.3 Non-Port/Non-Waterfront Related Industries

Other than support industries, there are few basic, heavy industries that would favour Squamish. As it is unlikely that a firm in Squamish could effectively compete in the Lower Mainland market, the industry must be rail oriented and serve the Interior market. Distribution and service establishments would be in this

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[11] Personal communication, Mr. M.C. Gow; Air Management Branch, Ministry of Environment.

category, as would warehouse facilities. Industries with both of these characteristics could be accommodated in the new industrial park and may be attracted to Squamish if land prices offer a sufficient financial incentive. At this time, there are no recorded inquiries from firms within this category of industries considering Squamish as a potential plant site.

5. SUPPLY OF INDUSTRIAL LAND

5. SUPPLY OF INDUSTRIAL LAND

The supply of land is defined, in the context of this study, to be the ultimate potential acreage developable at costs comparable to competing sites elsewhere in the Province. This study addresses the potential economic supply of undeveloped industrial land, rather than simply its physical presence. The discussion proceeds by first distinguishing the aggregate of developable industrial land in the study area from non-developable, and presently developed land. The development cost of these areas are estimated, then compared to similar parcels in competing areas of the Province. To a large measure, the information contained in this section is a summary of the "Industrial Land Value Study", prepared by Interwest Property Services Ltd. for the LUWG. The complete study is provided as an Appendix for those interested in a more detailed discussion.

Of the approximately 5,700 acres in the study area, it is estimated that 1,490 acres are potentially developable. This acreage is made up of three parcels as follows:

- Old Squamish Channel area	610 acres
- Area between the Mamquam Channel and the Squamish Highway	220 acres
- "Non-sensitive" Central areas	660 acres

In comparison, approximately 375 acres are currently developed industrial acreages and roughly 370 acres are existing commercial and residential areas. The remainder of the study area is either water areas, low areas adjacent to Squamish River subject to inundation, and inaccessible, steep hillsides.

Of the three parcels considered, two could be developed as port areas providing two berth spaces and back up land for storage and/or industrial development. The first envisaged port development area is on the old Squamish River Channel. This is essentially the proposal currently put forward by Squamish Terminals. The total cost of providing two additional berths and an uncovered wharf area adjacent to Squamish Terminals including the fill, ramps, dolphins, catwalks, paving and lighting for 60 acres of land is $10,100,000 (or an average cost of $169,000 per acre, excluding roads [1980 dollars]). This type of development would be suitable as a forest products port, or as a site for water oriented industries such as pulp and saw mills. The other potential port area is the area between the old Mamquam Channel and the Squamish Highway. The estimated cost of developing a two berth wharf with thirty acres of wharf space in this area is in the order of $5,760,000 (1980 dollars) or an average cost of $192,000 per acre. This potential development site is currently a Crown foreshore lease to Western Forest Products (Lot 5619) who have sub-let portions of it to MacMillan Bloedel for log booming and

storage. MacMillan Bloedel has expressed a desire to fill part of this site for dry land sorting of logs.

It should be clearly understood that these are development cost estimates only and do not include the cost of the raw land or the costs associated with any loss of fish habitat, etc. The base land cost in the old Squamish Channel adjacent to Squamish Terminals is likely quite low because of the land's location and limited uses.[12] Hence the development costs alone adequately measure the full development costs for this site. The raw land value of the area between the old Mamquam Channel and the Squamish Highway is in the order of $10,000 to $15,000 per acre because of the land's alternative uses for log storage. Total development cost plus raw land cost in this area would likely be slightly over $200,000 per acre.

Located within the 660 acre parcel identified as the "non-sensitive" Central area is the planned 245 acre industrial park. Since the topography of the entire area is fairly homogeneous, the development costs within the planned park should be representative of the entire area. Studies are currently underway to estimate servicing costs and alternative subdivision

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[12] The base land cost is the economic value of the land as determined by its opportunity costs. Since much of the land in question is currently leased to Squamish Terminals by BCR it is not likely to come up for sale, but the land still has economic value stemming from its alternative uses.

layouts. The first phase of the industrial park is proposed to contain 50 net acres with lots varying from .5 to 30 acres. The sewer services can be provided by extension from the adjacent development to the south, but service beyond the initial fifty acres would require upgrading. The estimated unit development costs is in the order of $16,000 - $19,300 per acre (not including fill). The servicing implied in this assessment is as follows:

- 24 foot paved surface, three foot gravel shoulders and open drainage
- overhead power lines
- water and sewer services to property line with no laterals

The ultimate development cost of this land must include the cost of fill.[13] However, estimates of this element of development cost are subject to great variation, since the source of fill and the amount required is not known at this time. Assuming that three feet of fill is required and that the material is found locally, the additional cost would be in the order of $10,000 per acre. The total cost of developing this initial fifty acres, not including raw land cost, is between $26,000 and $30,000 per acre.

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[13] Subdivision approval by Ministry of Environment under section 82(1) of the Land Title Act will require buildings in the proposed industrial park to be raised six to eight feet above natural ground level.

If these development cost estimates are accepted as the minimum market value of the developed land, then a comparison of the land values of similar parcels will establish Squamish's relative competitive position. With respect to port/waterfront industrial sites, Squamish would compete to varying degrees with comparable sites in North and West Vancouver, Lower Fraser River, Prince Rupert, Kitimat, and Vancouver Island. This comparison is somewhat tenuous, since large undeveloped acreages generally do not exist in these developed areas. Also, similar port facilities on Vancouver Island do not have direct rail access to north and central B.C., and Western Canada.

These costs correspond to filled, waterfront land, suitable for port facility development (but not including berth construction costs). Filled, deep water port land, suitable for finishing to an assembly wharf and dock standard, ranges in cost from $250,000 per acre in North and West Vancouver, $150,000 per acre in Delta, and $140,000 per acre at Duke Point on Vancouver Island. Recall that the complete development costs in Squamish ranged between $170,000 to $200,000 per acre.

It would not be appropriate to directly compare the estimated land development cost in the proposed industrial park to the sale price of parcels in other industrial parks, since the value of the land also reflects accessibility to support industries, urban centers and the like. A positive feature of the

proposed industrial site in Squamish is the rail access. However, the price of land would have to be substantially below present market prices to attract industry from more developed areas. A market price of $30,000 to $35,000 per acre may indeed be sufficiently below the existing market price to attract industry, but this implies that the raw cost of land is zero. The cost of fully serviced land in Lower Mainland Industrial Parks range from a high of $225,000 per acre in North Richmond to a low of $65,000 per acre in Langley. The median value is in the order of $80 to $90,000 per acre. Industrial land on Vancouver Island and Prince Rupert ranges in price from $65,000 to $90,000 per acre. Small parcels of industrial land in downtown Squamish have recently sold for $50,000 per acre. Hence, industrial land sites similar to those situated in the proposed industrial park, offering rail and port service, are priced substantially above the estimated development costs at Squamish.[14]

It must be noted that a pricing policy that sets the market price of the land developed in Squamish equal to its development costs, implies that the raw land value is zero. In comparing the price of land in Squamish to that in other areas, the comparison has been between land development costs and

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[14] The land prices provided in this section were those prevailing in late 1979 or early 1980. By the fourth quarter of 1980, industrial land prices in British Columbia had generally risen by 30 to 40 per cent (Source: Interwest Property Services Ltd.). This escalation will tend to make land in Squamish, priced at or near cost, increasingly attractive to industry.

development costs plus raw land values, respectively. Hence the difference in land values between Squamish and elsewhere should be considered as a maximum, since the price of raw land in Squamish will likely be greater than zero. However, the relative abundance of developable land in the study area suggests that raw land values will be low. If significant industrial development, in particular development of additional port facilities, does take place in Squamish then the price of raw land will increase from today's values.

In summary, new port developments in the Lower Mainland would be significantly more costly than a comparable port development in Squamish. However, this statement should not be construed to suggest that expanding port capacity of existing terminals in the Lower Mainland necessarily is more costly than similar expansions in Squamish. The price of land in the industrial park is contingent on the establishment of a raw land price policy. At the minimum (i.e., raw land price is zero), a sufficient incentive should exist to draw existing industry out of downtown Squamish. As prices elsewhere continue to rise, the industrial park should become more attractive to new industry as well.

6. CONCLUSIONS - INDUSTRIAL DEVELOPMENT AND LAND USE PLANNING IMPLICATIONS

6. CONCLUSIONS - INDUSTRIAL DEVELOPMENT AND LAND USE PLANNING IMPLICATIONS

To this point, the existing industrial land use in the study area, the positive/negative aspects of Squamish that may serve to attract new industry, and the supply and development cost of industrial sites have all been addressed separately. This section draws from the information presented earlier to establish basic relationships that the Planning Work Group should be aware of in designing a Management Plan for the Squamish Estuary.

The demand for additional industrial land, and changes in industrial land use activities, will stem from the existing industrial base established in Squamish and new industries attracted to Squamish. The challenge is to accommodate the needs of existing industries while not foreclosing opportunities to accept new industries, and simultaneously satisfying the region's social, economic and environmental requirements. With respect to the demands of existing industry for land within the study area, two key proposals are, first, the expansion of Squamish Terminals and, second, MacMillan Bloedel's proposed dryland sort operation. In addition, north of the estuary is the new industrial park in which industry is likely to locate. Specific proposals from new industries wishing to locate in Squamish have not been explicitly considered. However, analysis does indicate that Squamish offers a number of locational advantages and relatively low land development

costs, which will attract port and port related industries. For the non-port/non-waterfront oriented industries Squamish offers few advantages at this time. Hence the key to the future industrial land use demands in the foreseeable future, both on and off the estuary, is port development.

If there is no other terminal facility allowed on the estuary and Squamish Terminals is not allowed to expand, or only expands to meet its anticipated pulp storage needs, then the development of port related/non-waterfront industries is virtually foreclosed. These industries would not establish in Squamish because they would have no port to either receive or ship through. In this case, the industrial park would grow slowly as existing service industries move from their present locations.

Access to port facilities must be provided if port dependent industries are to be attracted to Squamish. However, availability of port facilities does not ensure that major industry will locate in Squamish, as there are a number of other factors influencing a major investment decision. It is certain, nonetheless, that major industrial development would not take place if the port facilities were absent. This study has not considered whether the proposed "third berth" at Squamish Terminals would be sufficient to meet the needs of port dependent industry (a smelter or a steel mill, for instance). If it is decided that only the existing terminal will be permitted on the estuary, then the

management committee must be certain that the present expansion plans of Squamish Terminals do not foreclose future port dependent industrial developments.

Another potential port site has been identified in this study. It is the approximately 60 acres between the old Mamquam Channel and the Squamish Highway which would be available at development costs slightly greater than those of the area adjacent to Squamish Terminals. Given the importance of port development to the study area's overall economic development, this alternative port should be seriously considered if the further expansion of Squamish Terminals is found to be unacceptable.

Another important relationship is that between land tenure and the incentive to invest in land. Much of the foreshore and adjacent lands are owned by the Crown or BCR, and are leased for particular uses. As was noted earlier, the insecurity of tenure related to some of these leases acts as a disincentive for investment and discourages more valuable uses of the land. If an objective of the Management Plan is to encourage more efficient land use, then the insecurity associated with the current leasing arrangements must be overcome.

This study has focused on industrial land use activity while not explicitly recognizing competing land use activities. However, development in the study area has been greatly influenced

by the restriction of industrial land use activity to protect other uses, notably the fishery resource. The now-abandoned port development proposal of the early 1970's has had a lasting impact on the Squamish Delta, due to the construction of the river training dyke to protect the proposed development. The dyke substantially reduced the flow of fresh water through the central basin, altering the channel's ecology toward a more marine environment. There is not sufficient information at this time to determine whether this area is more or less productive after this change. However, it is clear that the productivity of this area could be enhanced. Alternative strategies should be considered so that this enhancement need not necessarily preclude further industrial development. The central basin and the adjacent land is too valuable to the fishery resource and for industrial development to neglect. Positive government direction is necessary to enhance the overall productivity of this area.

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REFERENCES

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APPENDIX I

APPENDIX 1

Environment Canada / Environnement Canada

Fisheries and Marine / Pêches et Sciences de la mer

Rec'd JAN 10 1979

TM	S.A. TM	OM
ACTS ✓	TC	SUPT
TE		SUPT
Implicit		
Return to		
File		

January 4, 1979.

Your file Votre référence

Our file Notre référence

5903-85-S370

dc OG. ✓

Mr. T.W. Collard,
Terminal Manager,
Squamish Terminals Ltd.,
P.O. Box 1520,
Squamish, B.C.
VON 3GO

Dear Mr. Collard:

Re: Squamish Terminals Expansion

Reference is made to your letter of April 13, 1978, our meeting of April 18, 1978, and the copy of the minutes of the meeting which were forwarded to you by letter of May 26, 1978.

With reference to the last paragraph of the minutes of the meeting of April 18, it has come to my attention that the letter of response identified therein has not been provided to date. Accordingly I would like to take this opportunity to reaffirm this Service's recommendations regarding the proposed Squamish Terminals expansion.

This Service is prepared to further consider the construction of berth No. 2 on the east side of the existing terminal, and the chip berth on the west side, and would welcome the opportunity to review final plans for these proposals. As you may recall from your copy of this Service's letter of December 15, 1977 to Mr. W.E. Patton of Swan Wooster Engineering Co. Ltd., core sample testing for mercury content at berth No. 2 would be necessary prior to designation of a suitable dredge material disposal site.

With reference to the proposed fill on the north side of the terminal, this Service's position remains as stated in our letter of October 26, 1977, in that we must recommend against any development which would result in a permanent alienation of the brackish water marsh, which is considered to be a highly productive fish habitat.

. . . 2

Fisheries - Pacific Region
1090 West Pender Street
Vancouver, B.C.
V6E 2P1

Pêches - Région du Pacifique
1090 rue West Pender
Vancouver (C.-B.)
V6E 2P1

It is my understanding that the Water Investigations Branch of the Provincial Ministry of Environment has been instructed to provide guidance to Squamish Terminals Ltd. in their undertaking of studies pursuant to proposed expansion in the Squamish River Estuary. Please be advised that this Service has recently indicated to Mr. P.M. Brady, Director, Water Investigations Branch, our willingness to participate in this initiative. We look forward to further discussions regarding these matters.

Yours very truly,

F.C. Boyd, Acting Head,
Habitat Protection Division,
Resource Services Branch.

JAM/tc

cc: W.E. Johnson, Director-General
G.E. Jones, Chief, Fraser River - Yukon Branch
L.S. Freeman, District Supervisor
F.H. Wheeler, Fishery Officer, Squamish
F.C. Withler, Director, Resource Services Branch

APPENDIX II

APPENDIX II

BCR 1980 RAILCAR FORECAST

The B.C. Railway is important to the economic base of Squamish in providing direct employment in its yard and repair facilities, and through its indirect effect of encouraging port/industrial developments that utilize the rail transport link. This latter effect depends primarily upon the commodity mix transported south on the BCR line. In this appendix, the BCR's unofficial 1980 railcar forecast is presented and discussed. The purpose of this discussion is to relate the relative significance of the commodities transported by the BCR. This will serve to underscore the influence of these commodity flows on Squamish's economic development.

The BCR completes a one-year and a five-year railcar forecast for planning purposes. These forecasts are built up from the existing capacities, and expected capacity expansions, of plants serviced by the BCR with commodities flowing to interprovincial, North American and off-shore markets. Since the demand for BCR's major commodities (i.e., lumber and pulp) is cyclical, the railcar forecasts must be considered as tentative. For instance, the U.S. market traditionally absorbs a large proportion of the lumber moved south by BCR. This lumber is transported to the U.S. markets entirely by rail. However, with the recent downturn in the U.S. housing industry, lumber car

loadings have fallen off and have been diverted to export markets. In the latter case, the lumber is delivered to a port facility. Hence, not only has the volume of rail traffic been affected, but also the flow of traffic through specific stations. Another example is the government's decision to change its woodchip pricing policy. This change has stimulated domestic producers' demand for railcars to export chips. The 1980 forecast anticipated roughly 2,300 railcars would be required to move woodchips, but with the change in government policy, the demand may go as high as 10,000 railcars in 1980.

These examples illustrate the large divergence between expected car loadings/commodity flows based on a specific set of conditions and those actually realized. Although the railcar forecast is presented in quantitative terms, the range of commodities and their relative magnitude are of greater significance.

Table A2-1 summarizes the 1980 railcar forecast for traffic originating, terminating, and forwarded through Squamish by commodity. Railcars carrying logs and forest products are anticipated to make up the total traffic terminating in Squamish during 1980. The pulp and "lumber export" are delivered to Squamish Terminals for shipment abroad.[1] The logs are delivered to the Mamquam Channel for transport to other processing points.

[1] "Lumber export" is lumber destined for off-shore, non-North American points. Lumber exported to the U.S. is included under the category "lumber," rather than "lumber export."

Originating traffic is primarily made up of chemical shipments from FMC and Hooker Chemicals. The shipments are principally northward to the Interior pulp mills. Approximately 10% of the car loadings are south-bound.

Of the total rail traffic expected to move through Squamish in 1980, roughly 82% is southbound. The bulk of this traffic is forest products (91%) with lumber volumes alone (destined for Canadian and U.S. markets as well as export) making up nearly 70% of the car loadings. Grain, metallic concentrates, sulphur and petroleum products also move through Squamish to southern destinations. All of the southbound logs transported by the BCR are terminated in Squamish and 40% of the southbound pulp, but only 5% of the export lumber is terminated in Squamish.

The northbound traffic passing through Squamish is made up of BCR traffic, foodstuffs and liquor, and miscellaneous commodities. In contrast to the southern flow of raw and semi-processed natural resources, the northward flow consists principally of manufactured goods.

In summary, forest products dominate BCR's rail traffic. This circumstance reflects the forestry based economy of the central and northern Interior oriented toward U.S. and offshore markets.

TABLE A2-1

SQUAMISH 1980, TRAFFIC FORECAST
(RAILCARS)

Commodity	1979 Actual Loadings Terminating	Originating	Originating Terminating	North Bound	South Bound	Thru Traffic North Bound	South Bound
Logs	700		1,200				
Pulp	6,700[a]		3,860				6,000
Pulp from CPR[b]			950				
Paper							1,150
Lumber[c]		200					20,000
Lumber export			1,500				28,000
Veneer							4,300
Plywood							1,300
Wood Chipos							2,300
Grain							1,500
Metallic Concentrates							1,700
Sulphur							2,100
Petroleum Products						100	800
Chemicals	27	268		404			
BCR Traffic		160				3,500	
Piggy back[d]						6,500	
Propane/butane	51						
Miscellaneous		120[e]			46	5,500[f]	
TOTAL	7,478	648	7,510	404	46	15,600	69,150

[a] Includes lumber and pulp received from CPR
[b] pulp from Saskatchewan and eastern B.C. via C.P. Rail
[c] lumber destined for Canadian and U.S. markets as distinct from "export lumber" which is destined to off-shore markets
[d] piggy back refers to movement of foodstuffs, liquor and beer
[e] scrap metal
[f] Includes machinery

(Source: British Columbia Railway, unofficial forecast)

APPENDIX III

APPENDIX III

SQUAMISH INDUSTRIAL LAND VALUE STUDY

SQUAMISH ESTUARY MANAGEMENT PLAN

PREPARED BY

INTERWEST PROPERTY SERVICES LTD.

FOR THE

MINISTRY OF INDUSTRY AND

SMALL BUSINESS DEVELOPMENT

MAY 22, 1980

INTERWEST PROPERTY SERVICES LTD.

P.O. BOX 241, DELTA, B.C. V4K 3N7 • TELEPHONE (604) 946-1151

May 22, 1980

Mr. G.P. Sandve
Ministry of Industry
and Small Business Development
Province of British Columbia
Victoria, B.C.
V8V 1X4

Dear Sir:

RE: Squamish Industrial Land Value Study
for Land Use Work Group Meeting

In accordance with the terms of the agreement between Interwest and the Ministry our report, "Squamish Industrial Land Value Study" is presented here for your consideration.

This study offers general information as to the physical features, ownership patterns, industrial land values and availability of land and development costs in the study area. In addition, industrial land occupancy, availability and value information for other areas of British Columbia is provided as a basis of comparing the potential development in the study area with competitive alternate areas.

As the portions of the study area to be developed have not been specifically identified, a servicing criteria has not been formulated in Squamish and updated engineering data for existing elevations and fill requirements is not available, the conclusions in the report as to costs and values can only be used as a general guide.

A specific analysis of all areas designated for development indicating the potential values, costs, profits and absorption rate can be provided at an appropriate time.

Maps provided in this report are to be considered as suggestions of maps which the Land Use Group may find useful and are not necessarily relied upon in the report. As study area mapping to

Mr. G.P. Sandve May 22, 1980

be provided during the course of our investigation was not completed, there is no scale conformity in the maps in our report.

This assignment has been interesting and challenging. We recognize the difficulty in the utilization of the summarized data provided and will work to assist the group's understanding of the data and conclusions by additions to the report or in future meetings.

Respectfully submitted

Danny R. Grant, P.Ag., S.R.W.A.

Mario Pavlakovic,
B.Comm., R.I. (B.C.)

DRG/dm
MP

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1.3 Purpose of Study

The purpose of this study is to categorize the geographic areas and land ownership patterns in the Squamish Estuary, identify areas with potential for industrial development, and estimate the value of the developed industrial land for port and back-up industrial land uses.

1.4 Methods of Investigation

Through site inspection and aerial photographs, several areas were plotted on a small scale map and acreages in each category were calculated roughly by use of a planimeter.

Previously prepared ownership maps were combined with current assessment and B.C.R. lease information. Ownerships and tenants were plotted on a large scale map and then transferred in several categories to a small scale map to give an overview of the ownership impact.

In estimating the values of lands identified as potentially developable, a broad analysis was carried out of areas with any degree of competition for the Squamish area. This analysis involved an inventory of the amount of occupied and unoccupied industrial land and prices of serviced and unserviced acreages. In addition to the local information gathered from local planners, industrial development officers and assessors, officials

of the British Columbia Development Corporation, B.C. Railway and many industrial realtors were interviewed about specific areas and from this information, a compilation of coastal industrial parks was prepared.

Development costs were estimated by upgrading old engineering studies, interviewing large construction companies and from costing manuals.

Conclusions as to demand for developed land were drawn after analyzing the present and future availability of alternate sites and the economic advantages of the Squamish area for products from the North and Central Interior shipped to the coast for export.

2. SUMMARY

2.1 Developable Areas

There are three areas considered developable at this time. These are:

1. The accretions on the east and west sides of the old Squamish River channel on the central basin which contains approximately 610 acres excluding the water area.

2. The area between the Old Mamquam Channel and the Squamish Highway containing approximately 220 acres. Some of this area is presently occupied but a comprehensive development and replotting plan in this area could provide for substantially greater usage.

3. The Central non-tidal areas contain approximately 660 acres. This area is suitable for non-port industrial uses as well as non-industrial community oriented uses.

Total developable area for all uses is approximately 1,490 acres. This is substantially in excess of long range industrial requirements projected for the area and would provide substantial areas for non-industrial uses.

2.2 Development Costs

Depending on the suitability of dredged river sand for bulk filling the land, industrial development in the Squamish area will not be significantly different than for alternate areas. Due to lower standards, development costs will be less than in the Greater Vancouver area.

2.3 Supply of Alternate Industrial Lands in B.C.

There is a long term supply of land in the coastal areas for general industry. Statistics of occupany and vacancy, and consumption are misleading indicators as many parcels classed as occupied are only partially used and use intensification will provide substantial areas in addition to those now listed as vacant.

Although there are many port facilities, and development potential for the expansion of facilities in all areas now used, available land for port expansion is less abundant than for general industrial use.

For port oriented industrial land, located to economically serve B.C. Rail and British Columbia's north and central Interior, the supply of land is further restricted. For products shipped on B.C. Rail the port choices in future are

practically limited to Squamish, Britannia Beach, West Vancouver and North Vancouver.

West Vancouver and North Vancouver have a restricted supply of undeveloped or partially developed port lands with waterfront, but the handling capacity of existing facilities is expandable. Although Britannia Beach lends itself well to port development, the supply of useable land is severely restricted and Britannia could never be considered a major port for this reason. Developable port oriented land in the Squamish Estuary provides the only opportunity for a major new port facility to serve the B.C. Railway.

2.4 Prices in Alternate Areas (As of the Fall and Winter, 1979)

Prices for developed port acreage and industrial park small acreage range up to $5.50 per square foot in the best located areas around Burrard Inlet. Industrial lots of less than one-half acre range up to $20.00 per square foot.

Property values for non-port industrial lands tend to decline sharply as the distance from Vancouver increases. However, due to the cost of developing an assembly wharf and berths, the value of the actual deep draft waterfront acreage developed for port use does not decline by more than 10 - 15%. This stability in port values may also be due to the fact that many export products

are not produced in the metropolitan areas and will be exported from the most economic point.

In modern industrial parks in coastal communities there is no evidence of prices less than $50,000 per acre and no evidence of raw acreage at less than $15,000 per acre. However, most parks offer some fractional acreage parcels providing sites for small industries at $15-$20,000.

For the waterfront lands, the physical cost of creating the finished sites will be about $1-$1.50 per square foot less than comparable sites in Burrard Inlet and Prince Rupert, and over $2 per square foot less than the cost of proposed new sites in the Roberts Bank area. Because of the restrictions of product delivery capability in the B.C. Railway, this value differential is appropriate and the value of the industrial waterfront in Squamish will not be significantly greater than the cost of creating it. However, the expansion of this industrial waterfront is necessary for the success of the industrial development of the area and will create demand for lands in the Squamish Industrial Park.

2.5 Expected Prices in the Study Area

In Section 6.1 it was indicated that sales of small industrial sites have sold at $4 - $5 per square foot and that unserviced but filled acreage has sold as high as $56,000 per acre. Prices in the proposed industrial park can be a matter of

community policy, but the park can be developed at a low enough cost to generate a substantial profit or to provide sub-market prices as an incentive for industries to move to the park.

Small parcels can be offered at $1.50 per square foot which is substantially less than downtown prices, and the small acreages can be offered at $50 - $60,000 per acre filled or adjusted if the land is not to be sand filled. Larger sites in the park area for large manufacturers can be calculated on the basis of services required when they are in demand.

3. DESCRIPTION OF STUDY AREAS

3.1 Area Data of Record

Location: Squamish is located 41 road miles north of Vancouver. The docks at Squamish are 30 miles north of the shipping entrance to Burrard Inlet.

Area: 26,816 Acres.

Population (1976): 8,368

No. of Households: 2,610

Services:

Water	- Municipal
Sewer	- Municipal "cell" type system
Electricity	- B.C. Hydro
Telephone	- B.C. Telephone
Hospital	- 21 Bed, Squamish General
Transportation	- Rail - British Columbia Railway
	- Road - Paved highway from Squamish to Vancouver. All weather and pavement to Lilloet connecting with Trans-Canada.
	- Air - Municipal Airport north of Brackendale.

3.2 Location

The study area is defined as that portion of the lower Squamish River Valley, shown cross hatched on an aerial photograph provided by the Ministry of Industry and Small Business Development, consisting of approximately 5,700 acres.

3.3 Study Area Physical Inventory

3.3.1 Land Areas Considered for Development

For ease in description of study areas, the following breakdown is helpful. All acres are planimeter calculations from a reduced map and are not considered more than 95% accurate. The identification of some areas is judgmental but conclusions in this report are not dependent on all party agreement of what are environmentally sensitive or non-sensitive areas, or areas suitable for habitat enhancement.

A. Water Areas:

a.	Howe Sound	337 Acres	
b.	Squamish River	224	
c.	Old Squamish Channel	250	
d.	Mid Channel	52	
e.	Old Mamquam Channel	109	
	Sub Total		972.0 Acres

B. Land Areas not currently developable, West of Training Wall and North East of Mamquam Channel:

a.	Low areas adjacent to the river, subject to inundation	270 Acres	
b.	Inaccessible steep hillside	1438	
c.	East of Highway and Hydro line	785	
d.	Presently developed industrial areas	375	
e.	Existing residential and commercial	370	
	Sub Total		3238.00 Acres

C. Developable Areas:

a.	Old Squamish Channel area (exlcudes water of 250 acres)	610 Acres	
b.	Area between Old Mamquam Channel and Squamish Highway	220	
c.	Non-sensitive Central areas	660	
	Total Developable		1490.00 Acres
	TOTAL		5700.00 Acres

Those areas presently covered by water have not been considered as developable for land oriented uses because of the

required water flow, drainage, water lot useage and ship maneuvering space. However, the following areas may have some use in the development:

A-c - to provide additional land in adjacent areas additional dredging of this area would be required with the spoil used as land fill.

A-d - the north areas of this mid-channel could be filled if drainage is provided for.

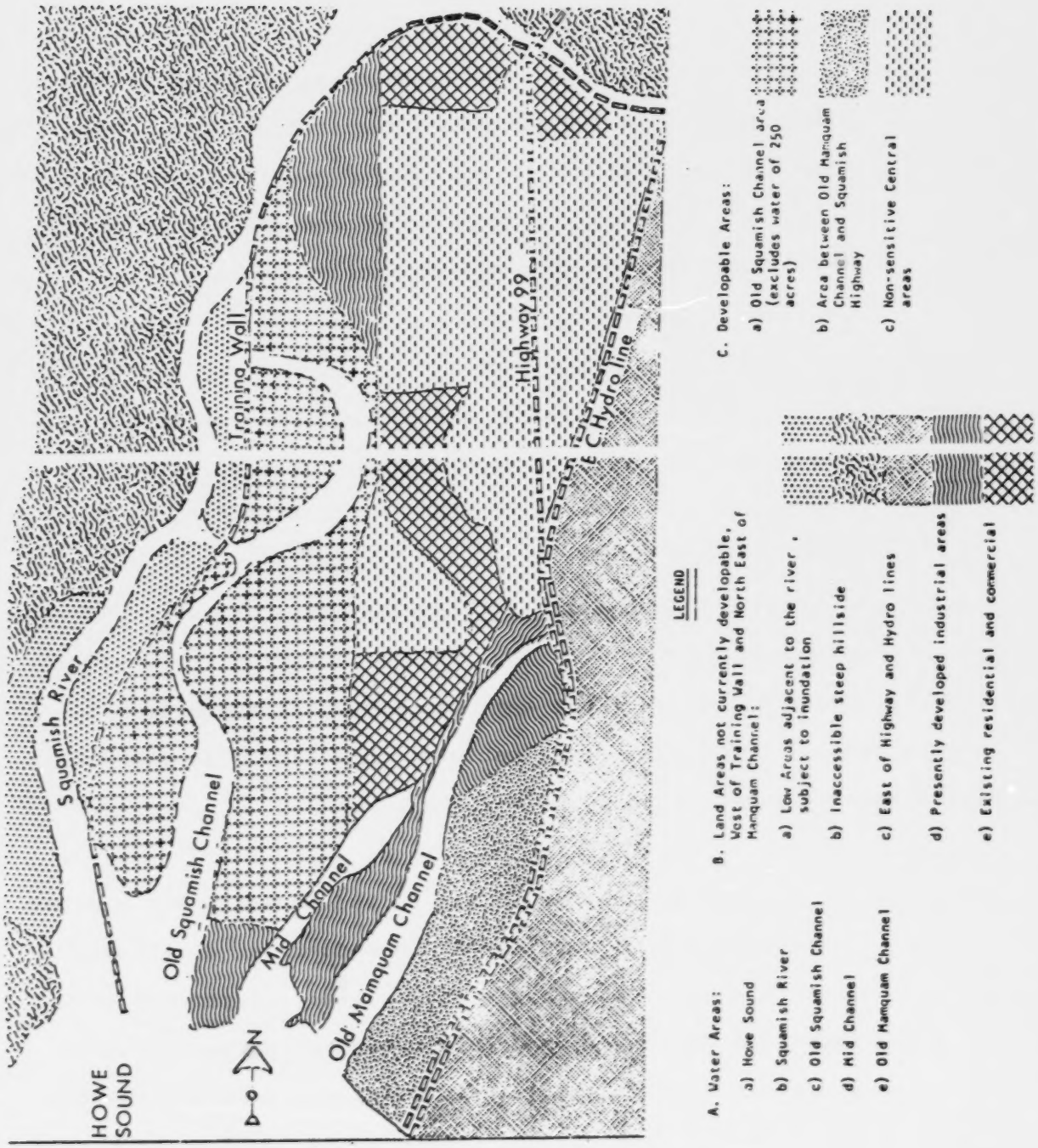
A-e - filling the extreme north end of this channel with provision for drainage may also be practical in the future but the acreage provided would be small.

3.3.2 Land Areas Not Considered for Development

These areas are those which for physical and economic reasons are not considered developable at this time. A description of the areas follows here:

B-a - The river flat areas adjacent to the Squamish and Mamquam rivers can not be considered for industrial development at this time. These areas lack access and provide an important flood buffer area between the normal channels and the channels while in flood which can extend between the dyke and high ground. These areas could present

PHYSICAL INVENTORY

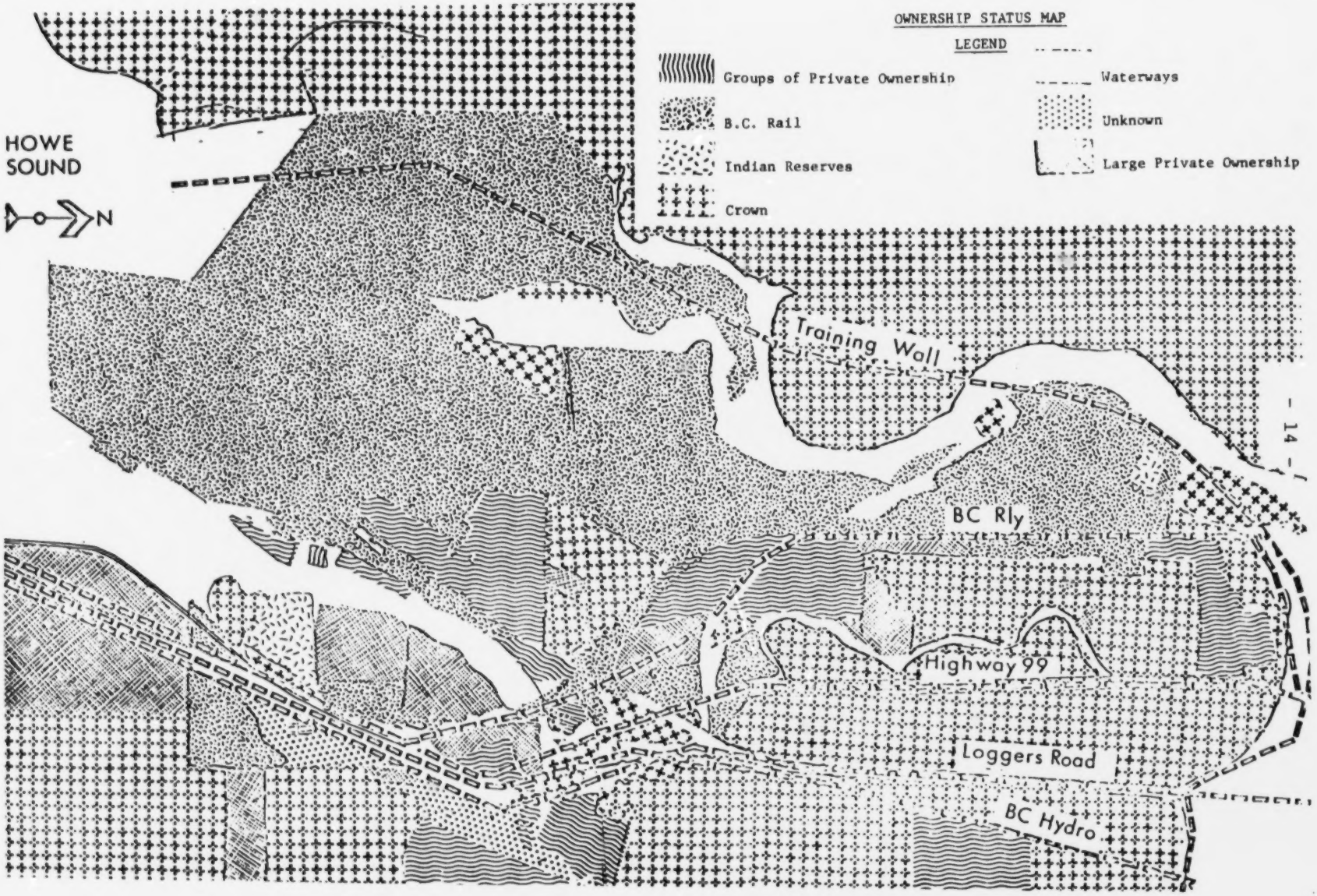


possibilities for the development of fish and wildlife habitat.

B-b - This area lies to the west of the Squamish River Channel and, as shown on the topographic plan, it has steep slopes. At present there is no road access to this area and to be considered for development a bridge and road would have to be constructed.

3.4 Study Area Ownership Status

In categorizing the ownerships in the study area the main sources of data were the B.C.R. who provided a map indicating all lands considered under their control or ownership, the B.C. Assessment Authority with whom the large private ownerships were reviewed, and a status map prepared by D. Karpick of the Ministry of Lands, Parks and Housing dated 27-2-80. An exact breakdown of all ownerships was not possible but would not serve a practical purpose when considering the large volume of small private holdings that do not lend themselves to a development scheme. The major purpose of this ownership inventory is to provide an overview of the possible consolidation problems that might arise in the areas suitable for development. To provide this overview an ownership status map is included following this section. See also the LUWG land status map located in the envelope on the inside back cover of this report.


OWNERSHIP STATUS MAP
LEGEND
Groups of Private Ownership
B.C. Rail
Indian Reserves
Crown
Waterways
Unknown
Large Private Ownership
HOWE SOUND
N
Training Wall
BC Rly
Highway 99
Loggers Road
BC Hydro

Of the three areas of potential development indicated on the physical inventory map as C-a, C-b and C-c, it is apparent that area C-b will be the only one where ownership consolidation will be a major step in the optimum development of any of the areas. In this area, however, the ownerships are primarily major forest industry firms such as Weldwood, Rayonier and MacMillan Bloedel. Although some smaller ownerships exist, the companies involved are also in forest related industry with the exception of the Indian Reserve.

C-c - B.C.R., the Crown and MacMillan Bloedel control over 90% of the land and, even if consolidation was not possible with the smaller owners through trading land or replotting, the small ownerships could probably be facilitated in the development plan.

C-a - All of the land is Crown Provincial or B.C.R. so ownership in this area would not impede a development scheme.

B-c - Within the study area much of the portion east of the Squamish-Horseshoe Bay Highway and east of the B.C. Hydro right-of-way has steep terrain and is not practically developable at this time. A small area just east of Weldwood is level enough for development and an insignificant part of the area is presently in housing. It should be noted that just east of the areas shown as

K-4 to K-10 on the aerial photograph of the study area there is a bench that may be suitable for long range development.

B-d - In the presently developed industrial areas there is some room for more intensive use and possible changes of use to better utilize the waterfront. However, because of existing improvements there is little likelihood of change during the economic life of those improvements. It should be noted that the potential for more intensive use or change is not a significant factor. There are difficulties of ownership or tenancy change and the land required for any relocations would balance the benefits when considering the total usable area.

B-e - It is physically possible to relocate the existing residential and commercial portions of the study area to allow for industrial land use. However, this idea has been rejected in a public survey and the land provided would have to have a value as great as the sum of the acquisition costs, demolition costs, costs of an alternate area and relocation costs. As this area provided would be back-up for port lands, the value for the present uses, if vacant, is already in excess of the value for back-up industrial lands without considering all the other factors.

4. DEVELOPMENT COSTS

4.1 Currently Developable Area C-a

This area consists of marshy areas subject to inundation and higher wooded areas not normally subject to inundation totalling approximately 610 acres, in addition to 250 acres of water area. In this area portions of the central basin could be dredged for moorage and the other areas filled with the spoil. Filling could take place as demand required additional land or in an initial comprehensive scheme.

General costs are given for both the development of water oriented industrial land and specifically for wharf facilities.

Some clearing will be required in the wooded areas at about $2,000 per acre but this does not involve the area in the Squamish Terminals lease.

The land in area C-a can be filled with dredge material to a 13 foot Geodetic standard and have bank protection applied where necessary at $35,000 per acre. Roads and utilities will cost approximately $150 per lineal foot depending on the standards applied.

4.1.1 Assembly Wharf Costs

Two additional berths can be provided adjacent to Squamish Terminals including the 1,100 feet of wharf, ramps, dolphins, catwalks, paving and lighting covering 60 acres of land at a total cost of about $8,000,000 for uncovered wharf area. This is $4,000,000 per berth over the filling costs.

No sewers or additional water service are anticipated for the wharf area.

Total costs for creating two berths and 60 acres of assembly wharf adjacent to the Squamish Terminals lease:

Filling and bank protection	$2,100,000
2 Berths, paving, lighting, drainage	8,000,000
Rail facilities	70,000
Road, approximately 1,000 ft.	150,000
	$10,320,000

To create two additional berths, fill 25 acres, pave and service an additional 10 acres, Squamish Terminals has estimated the costs at $11,000,000. The cost differential arises from a 25¢ per yard difference in dredging estimates and in filling and providing a less expensive berth on the west side, which is substantially cheaper than the berth on the east side proposed by Squamish Terminals.

4.2 Currently Developable Area C-b

Area C-b located from Mamquam Channel to Highway comprises 220 acres, or net after development, 175 acres (depends on channel width).

Development Procedures:

- Assemble land into a single ownership or joint venture.
- Cut knolls, dispose of rock in other areas or as bank protection. Fill with dredge material from Mamquam Channel.
- Developing this area will require relocating the B.C.R. main line to parallel the highway and a slope down to the developable area.
- The area could provide land with a developed land elevation of 13 feet (Geodetic data), the same as the FMC site, or a multi-level site if rock disposal is not practical.

Costs of development could vary considerably depending on the program of overall development in the area. The rock available from quarrying the knolls could be used for rip rap on the developed banks of this and other developable portions, in additional dyke works on the Mamquam River, or in port construction in other areas such as Roberts Bank. The material would have to be

saleable or useable in other projects to warrant the expense of carrying out the quarrying project.

Developing the land at more than one elevation could provide 60+ acres at 13 feet Geodetic that was water oriented and about 115 acres of higher land at about 100 feet Geodetic. This would make the area available for use years earlier at substantially reduced costs but would reduce the port orientation possible in this area.

With regard to development costs for DL5619 only; if this area was used for a 2-berth assembly wharf, the approximate costs would be as follows:

Dredge, fill and protect 60 acres @ $35,000 per acre	$2,100,000

To finish an open-dock facility, dolphins, catwalks, black top, drainage and lighting are required:

1,100 lineal ft. of concrete wharf, dolphins, catwalks and other dock facilities	$6,210,000
For black top, drainage and lighting	$3,300,000
Total costs for 2-berth assembly wharf	$11,610,000
Total per berth	$5,805,000

Total per acre for 60 acres $193,500

Road and rail service is an additional cost and would be apportioned to adjacent area.

NOTE: All costs are approximations and may vary + 20% depending on detailed engineering and design.

4.3 Currently Developable Area C-c

This portion of the study area contains approximately 660 gross acres of industrially developable land lying at elevations beyond tidal influence. In addition, much of this area is situated in good proximity to existing services such that major off-site upgrading would not be required in the initial phases. An industrial park of 245 gross acres has been proposed for the area between the Garibaldi Highway and B.C. Rail yards, with the existing residential and commercial development fringing on the north and south. As similar characteristics are evident throughout this developable area, similar development treatment and concepts can be anticipated for the remaining 450 acres.

The proposed 245 acre industrial park has been studied and had preliminary engineering work performed on it by Web Engineering Ltd. and Hub Engineering & Development Co. Inc. Each firm has made estimates as to servicing costs, with some variations as to layout and servicing levels. Using these cost estimates in

conjunction with a Marshall-Swift Costing Manual, an estimate of development cost per acre has been derived.

The first phase of the industrial park is proposed to contain 50 net acres of land with lots varying from 0.5 acres to about 3 acres. The sewer services can be provided by extension from the adjacent development to the south; however, service beyond the initial 50 acres would require upgrading. It is felt that further refinement can be carried out with both preliminary layouts to optimize the ratio of net to gross acreage as well as decrease the length of roads per net acre.

The 50 acre initial phase will incur development costs in the order of:

Roads

6,600 feet, 24 foot paved surface	$380,000
Clearing and grubbing	20,000

Waterworks

7,200 feet of distribution main	$130,000
Hydrants and service connections	31,000

Sanitary Sewer

6,500 feet of collector mains		$102,000
Service connections		22,000
Pump station and modifications		55,000
		$740,000
Drainage	$75,000	
Landscaping	30,000	
Engineering, Planning & Contingency	150,000	225,000
		$965,000

The foregoing cost estimate indicates a unit development cost of $19,300 per acre. The foregoing conceptual layout provided 264 feet of frontage per acre, however, as noted previously, a more optimum layout could reduce road length to at least 5,000 feet. Such an adjustment would reduce costs overall by approximately 20%, or to under $16,000 per acre. The servicing levels considered are not to optimum urban standards including only:

(1) 24 foot paved surface with 3 foot gravel shoulder, open ditch drainage.

(2) overhead power provided by B.C. Hydro.

(3) water and sewer services only to property line with no laterals.

No allowance has been made for fill as this item can be considered as a purchaser/user responsibility or cost. The cost of filling will vary depending upon material used as well as method employed.

(1) Pumping sand to site is estimated at $1,700 per acre foot plus royalties; however, this is only feasible for distances of 1/4 mile to 1/2 mile. Additional handling for further distribution can contribute up to $3,200 per acre foot of added cost.

(2) A less costly alternative is to use the sand fill only for building site while filling the storage and parking areas with "hogged-fuel" covered with 1 foot of gravel. This material is a non-pulpable mill waste that is available locally at no cost. The gravel cover, however, will cost in the order of $11,000 per acre foot in this area due to handling and haul distance.

The subject area generally requires at least 3 feet of fill material. Filling by individual owners would require more material handling and greater cost than a comprehensive filling program. For the required minimum elevation the total sand fill alternate indicates a cost in the order of $8,000 to $10,000 per acre considering some required handling. The second alternative indicates a somewhat higher per acre cost depending basically upon the cost of the gravel cover. The latter alternate costs are altered little if higher elevations are required, whereas the sand alternative varies directly with desired height.

The foregoing servicing and fill costs compare favourably with other areas of the lower mainland such that development costs would not create an uncompetitive price level for industrial land of this type.

5. INDUSTRIAL LAND INVENTORY

5.1 Occupied and Unoccupied Lands

In this phase of the study, Lower Mainland and Vancouver Island areas that have existing or proposed port facilities were studied. The sources of data were the Municipal and Regional Planning Offices, British Columbia Development Corporation and B.C. Rail. Due to the varying orientation in gathering the data, some sources were not exact in material presented to us. In many cases municipal and city data were in direct conflict with Regional District data. Part of the problem is the inclusion of gravel pits, transportation and communication sites in the municipal estimates. Although these are important uses, they are not anticipated in the study area and were excluded from the data gathered wherever possible.

The following tables summarize data collected and reviewed prior to forming conclusions about industrial land availability, particularly in port areas. After a review of the data and visiting many of the areas the following four conclusions can be made:

1. The four main port areas of Greater Vancouver, Prince Rupert, Kitimat and Squamish with railroad, flat land, and deep moorage, all have a comparative advantage for some similar products originating from different areas. It is physically

possible to export all products from any of the ports because of the road and rail grid in the province but products gravitate to the most economic shipping point.

2. Port areas on Vancouver Island primarily export products mined, harvested or produced on Vancouver Island. However, the forest industry may use timber harvested on the mainland that can be competitively manufactured and shipped from the island. In other words, an area such as Duke Point (Nanaimo) would not compete as a port for shipping mainland manufacturing or minerals but the pulp mills and sawmills located there will compete with mainland mills for raw products and will thereby be competitive with mainland ports in a secondary way. There are several port areas that can be expanded or created on Vancouver Island. With the exception of the Greater Victoria area there are ample future supplies of port and general industrial lands to serve Island needs in the foreseeable future.

3. Based on present projections, there will be little undeveloped industrial land in the Greater Vancouver Regional District past 1986 and virtually none past 1990; however, the developed lands will be more intensively used and will produce more capacity for growth than is statistically evident. Although there is great physical capacity, concerns over the preservation of all agricultural lands (salt marshes), in Delta, Richmond and Surrey substantially reduce available areas.

The industrial saturation in the Greater Vancouver Regional District will gradually extend to the Central Fraser Valley Region, Dewdney-Alouette Region and Fraser-Cheam Region for non-port lands. These areas do not have deep moorage capability and port expansion in the G.V.R.D. will be necessary if the present rate of export growth continues.

As the ports for bulk loading and cargo in Delta, Surrey, Richmond, New Westminster, the Vancouvers and Port Moody approach capacity there may be a trend to bypass these areas with some products and ship out of the closest alternate area. This can be by rail or road to Squamish or by barge or small ship to Vancouver Island ports. However, as a general trend, transshipping to an export point will not occur for some time.

4. Concentrates from new mines, pulp and lumber from new mills in the central and northern Interior areas served by B.C. Railway can be shipped by rail, to or through the Squamish area and/or Britannia to shipping points for export. As the port of Vancouver nears throughput saturation Squamish and/or Britannia will increase in importance as B.C. Railway ports.

TABLE 1

INDUSTRIAL LAND INVENTORY OF ZONED, OCCUPIED, UNOCCUPIED AND SERVICED LAND

REGIONAL DISTRICT	TOTAL INDUSTRIAL AREA	OCCUPIED	UNOCCUPIED	SERVICED	COMMENTS OR OTHER INFORMATION
G.V.R.D.	(Areas expressed in acres)				*additional area required by 1986
Richmond	4173	1588	2585	2190	950
Burnaby	1500	650	850	650	700
Vancouver	Unknown	1475	Unknown	Unknown	110
North Vancouver & West Vancouver	Unknown	275	Unknown	Unknown	100
Surrey	1658	769	888	949	950
New Westminster	869	389	480	869	250
Pt. Moody, Pt. Coquitlam & Coquitlam	Unknown	1200	Unknown	Unknown	1040
Delta	2950	950	2000	1800 by '81	1000
				TOTAL	5100
	*G.V.R.D. Statistic of Industrial Land required by 1986.				
Fraser-Cheam					
Chilliwack	640	200	440	50	
Dewdney-Alouette					
Mission	515	170	345	400	
Maple Ridge	405	205	200	200	
Pitt Meadows					
Central Fraser Valley Regional District					
Langley City	355	220	135	Unknown	Port orientation in this area is limited to barge facilities on the Fraser River
Langley Township	1630	533	1097	750	
Matsqui	805	245	560	250	
Abbotsford	84	28	54	Unknown	

TABLE 1 (Continued)

REGIONAL DISTRICT	TOTAL INDUSTRIAL AREA	OCCUPIED	UNOCCUPIED	SERVICED	COMMENTS OR OTHER INFORMATION
Metropolitan Victoria includes:	North Saanich, Airport, Sidney Central Saanich, Saanich, Victoria, Equimalt, View Royal, Langford and Colwood,				As in the Burrard Inlet area, harbour facilities in this area are mostly occupied but uses can be intensified.
	1322	996	234	un-known	
Nanaimo	2040	880	536	1416	
Cowichan Valley Regional District	909*	272	729	618	*Includes gravel pits
Prince Rupert	797				Figure is BCDC park only. Other land is available.
Kitimat	4090	308	3782	308	Major port development is possible in this area

5.2 Current Industrial Value Estimates (Based on Sales during Fall and Winter 1979)

In estimating industrial land values for the study area it was necessary to review prices in other areas that would have some degree of competition for potential uses of land that may be developed in the study area. Many coastal, Island and Fraser Valley areas were investigated and the general value ranges from each area are listed in Table 2 in this section. The values shown result from extensive interviews with area assessors, industrial park developers, real estate boards and from actual sales in many cases.

Due to the extent of the area studied, inspection of actual sale properties was limited. Refinements for the exact level of servicing and the extent of individual parcel development were not possible.

In many instances, values shown in Table 2 may represent a sale of the only available parcel of a given class. Therefore, no conclusion should be made that, because a land class is valued in Table 2, a parcel of the size shown is currently available. A direct comparison can and should be done with the study area when a development plan is formulated and the demand can be better estimated.

As might be expected, industrial values around the Burrard Inlet port lands are the highest in the province with the highest being on the Vancouver or south side. Port land values then drop off as the distance from the Vancouver core increases.

Small pockets of values higher than other areas equal distance from Vancouver exist where community cores are near the port lands, such as New Westminster, North Richmond, South Vancouver, Victoria and Nanaimo.

Although comparison of the unit values for developed waterfront large acreages and small acreages in industrial parks indicate some similarity, such a comparison is out of context and invalid. The port lands usage enhances the nearby industrial lands and the services to each class is difficult to compare.

For the wharf lands, the main costs are the berth facilities with little spent on roads or utilities. For industrial lands, the major costs are paved roads, underground power, storm and sanitary sewer, water and gas lines and municipal fees. These services can reach as much as $200 per lineal foot and municipal fees can be in excess of $20,000 per acre.

The tables do not reveal one other factor and that is, in interior or non-port areas, industrial values do not reach the same levels as the port areas. It is important, then, in comparing assembly wharf lands and general industrial lands at similar

prices, to note that without the adjacent ports the proposed industrial park area would have little economic basis to support the higher prices evident in port areas.

It may be concluded that, although the value of industrial lands in Squamish, at present, and in the proposed industrial park will more closely approximate interior prices, the expansion of the port and port oriented manufacturing will exert substantial upward pressure on the other industrial land values as well as values in other land use classes.

Filled deep water port land suitable for finishing to an assembly wharf and dock standard in parcels of 30 to 150 acres ranges from $200,000 per acre on the north side of Burrard Inlet to $150,000 per acre in Delta, $140,000 per acre in the Duke Point development and $45,000 per acre in Britannia. Fully developed sites in these areas with docks, paved assembly areas, etc., range from $140,000 to $250,000 per acre, or more. The cost of constructing facilities and the locations cause the differentials in both developed and undeveloped lands.

Undeveloped industrial lands with good proximity to ports range from a high value of $100,000 per acre adjacent to the deep water ports down to a low of $15,000 per acre adjacent to barge loading waterfront. Shallow draft frontage is more abundant and tends to be priced the same as adjoining industrial land.

Fully serviced industrial lands range from $50,000 per acre in many small town industrial parks up to $20 per square foot ($871,200 per acre) for small industrial lots in Vancouver. In areas close to Vancouver where developed industrial acreage sites are available, such as Richmond and Burnaby, values of 1 to 3 acre sites are about $250,000 per acre.

Generally, it is the practice of rail oriented park owners such as B.C. Hydro and B.C. Railway to price rail and non-rail lands in the same park at similar prices. If there is any difference in price, the rail oriented sites may be offered at a lower price in order to attract a good rail user to the park. However, the cost of installing the rails is charged to the user. In addition, the user may either purchase or rent the rails and ties, etc. from the rail line. The total cost can be expected to be from $50-$55 per lineal foot of track depending on difficulty of construction.

Our conclusion is that there is no measurable difference in the net raw land value for rail and non-rail subdivisions.

TABLE 2

CURRENT INDUSTRIAL LAND VALUE ESTIMATES

Area	Waterfront Industrial Size	Waterfront Industrial Price/Acre	Non-Waterfront Size	Non-Waterfront Price/Acre	Undeveloped Large Acreages Price/Acre
Victoria	1 acre	$220,000	1 acre	$180,000	$100,000
	3 acre	170,000	3 acre	100,000	60,000
	5 acre	140,000	5 acre	60,000	40,000
Duncan	None		1-5 ac.	50,000	25,000
			10 ac.	40,000	15,000
Chemainus	1-5 ac.	90,000	1-5 ac.	50,000	25,000
Port Alberni	200 ac.	45,000			
	1 acre	150,000	5-20 ac	$60-80,000	$20-30,000
Maple Ridge Ind. Park					
	1-5 ac.	60,000	1-5 ac.	60,000	40,000
	10+ ac.	50,000	10+ ac.	50,000	$25-30,000
Albion	1-5 ac.	$60-75,000	1-5 ac.	60,000	$30-40,000
	No larger acreages			Remote	$10-25,000
Surrey	1-5 ac.	$150-185,000	1-5 ac.	150,000	120,000
	10 ac.	140,000	10 ac.	125,000	100,000
Port Moody	1-10 ac.	100,000	1-10 ac	$80-100,000	$60-80,000
Glenaire Waterfront					
	400 ac. large parcel			70,000	None
Coquitlam	1-5 ac.	210,000	1-5 ac.	165,000	110,000
	5+ ac.	140,000	5+ ac.	100,00	$70-100,000
Burnaby Kapoor -	10 ac.	130,000	None		None
Stanovan - large acreage only		120,000	None		None
Lake City	1 acre	None	1 acre	217,000	None
	30 ac.	None	30 ac.	127,000	None
Winston	1 acre	None	1 acre	200,000	None
	30 ac.	None	30 ac.	117,000	None
Still Creek	1 acre	None	1 acre	190,000	None
	30 ac.	None	30 ac.	124,000	None

TABLE 2 (Continued)

CURRENT INDUSTRIAL LAND VALUE ESTIMATES

Area	Waterfront Industrial Size	Waterfront Industrial Price/Acre	Non-Waterfront Size	Non-Waterfront Price/Acre	Undeveloped Large Acreages Price/Acre
Richmond					
North Arm Fraser	1 acre	225,000	1 acre	200,000	150,000
	10+ ac.	150,000	10+ ac.	125,000	100,000
South Arm Fraser	1 acre	165,000	1 acre	140,000	90,000
	10+ ac.	130,000	10+ ac.	100,000	70,000
Delta	4-5 ac.	150,000	1-2 ac.	80,000	25,000
				Peat	15,000
North and West Vancouver					
	5-20 ac.	250,000+	5-10 ac	160,000+	
			1-2 ac	250,000+	
			.25-.5 ac	450,000+	

Britannia

1 sale only. All developable land held by Dome Petroleum and Copper Beach Estates Ltd.

Waterfront with port industrial potential.

Total land - 620 acres. Usable - approximately 150 acres.

Water lot lease - 13.5 acres.

Approximate price per usable acre - $45,000.

Vancouver

Very few sales of unimproved land occur in Vancouver and fewer still are acreage. The small industrial zoned lots that do sell range in value between $12 and $20 per square foot ($525,000 - $860,000 per acre).

5.3 Fully Serviced Land Values in Coastal Industrial Parks

	INDUSTRIAL PARK	LOCATION	PRICES*
1	North Langley Industrial Park	Surrey-Langley Border	$100,000/acre
2	Riverside Industrial Park	South Richmond	$165,000/acre
3	Crestwood Industrial Park	North Richmond	$225,000/acre rail
4	Tilbury Industrial Park	River Road-East Delta	$80,000/acre rail
5	Newton Industrial Centre	North Newton, Surrey	$80-$85,000/ acre
6	McClellan Industrial Centre	East Surrey	$77-$80,000/ acre rail
7	Production Way Industrial Centre	Langley City	$65-$80,000/ acre rail
8	Koksilah Industrial Park	Duncan	$55-$76,000 acre rail adjacent
9	Maple Ridge Industrial Park	Maple Ridge	$75-$90,000/ acre rail
10	Mayfair Industrial Park	Cape Horn Area of Coquitlam	$142-$195,000/ acre. Some rail
11	Duke Point Industrial	Nanaimo	$85-$90,000/ acre. Will be adjacent to Federal cargo wharf
12	City of Port Alberni	Port Alberni	$55-$76,000/ acre. Close to Island rail and sea terminal.
13	Prince Rupert Industrial Park	Prince Rupert	$85-$95,000/ acre. Barge loading available. No rail.
14	Terrace Industrial Park	Terrace	$50,000/ acre rail
15	Gibsons Industrial Park	Gibsons, B.C.	$75-$80,000/ acre 7,500-11,100 sq. ft. lots. No rail or water.

*Fall and winter of 1979

6. SQUAMISH AREA INDUSTRIAL LAND

6.1 Current Supply of Land

Although the William Graham & Associates' study for the industrial park indicates a current availability of less than 5 acres of industrial land, this figure relates more to the amount of zoned land currently for sale rather than actual availability.

There are still 20 - 30 acres of privately owned lands east of the Old Mamquam Channel that have recently changed hands and are either available for development or are being developed at this time. In addition, there are vacant areas on Weldwood lands and on B.C. Railway lands now under lease. However, the amount of industrial land available to the small companies is extremely limited as few of these previously mentioned areas would be available to small users.

6.2 Current Industrial Values

An important consideration in the determination of the success of any industrial development in the study area is the current price structure of industrial lands. As much of the present industrial land is owned by B.C.R., it is important to consider the lease rates and values to which the rates are applied.

Current sales in several Squamish locations have been investigated and, based on this analysis, the following value

structure has been derived:

Land Class	Size	Price Range
Serviced Commercial	6,500-20,000 sq. ft.	$10-$12/sq.ft.
Serviced Industrial	6,500-13,000 sq. ft.	$4-$5/sq.ft.
Unserviced Industrial	4-15 acres	$13-$15,000/
Piling required for buildings.		
Unserviced, Non-waterfront, uncleared, no fill required		$15,000/ useable acre
Unserviced Industrial Acreage		
Waterfront for log access only servicing potential, good footings and highway exposure		
	2.5 - 5 acres	$31-$56,000/ acre

B.C.R. leases include large port, waterfront 60 to 80 acres, small waterfront, and small non-waterfront sites. B.C.R. waterfront port lands are assessed at from $16,500 to $20,000 per acre, log sorting and storage sites are assessed at from $19,000 to $25,000 per acre and small industrial sites of .5 to 2 acres are assessed at $70,000 to $110,000 per acre. These land values attributed by the assessor to the land occupied by B.C.R. tenants do not bear any relationship to market values.

On all but Squamish Terminals and FMC properties, lease rates are based on 8% of the assessed values. However, on Squamish

Terminals and FMC properties where the assessed values deviate furthest from the market values the leases are based on a negotiated long term rate for the undeveloped land plus a contract for rail usage.

Based on these sales and leases, it is apparent that as demand warrants the following values could be applied:

Land Class	Size	Price Range
a. Undeveloped waterfront marsh land requiring fill, suitable for port development	50+ acres	$500-$1000/ acre
b. Undeveloped waterfront marsh land requiring fill, suitable for saw mills, etc.	50+ acres	$500-$1000/ acre
c. Undeveloped non-water oriented industrial acreage, services available, no fill required, rail access available	5-20 acres	$15,000/ acre
d. Small acreage parcels serviced and filled	1-2.5 acres	$50-$60,000/ acre
e. Small industrial parcels serviced and filled but no highway exposure	10,000-20,000 sq.ft. (1/4-1/2 acre)	$1.50-$1.75/ sq.ft. ($60,000-$75,000/ acre)

6.3 Planning Aspects

As outlined in the description of the development areas, it is indicated that there is a total of 1,490 gross acres that are developable. These figures exclude any channel or waterlot areas and are gross figures from which must be deducted areas for road and rail service for the development. Also, as indicated in the description of the development areas, there would not appear to be a current economic justification for the development of any more than 60 acres of assembly wharf space, 50 acres of land in an industrial park, and 60 acres in forest oriented uses such as log storage and an additional sawmill. This would provide a total of 170 acres of industrial land, which would be comparable to one half of the present occupied area. This leaves a total of 1320 acres within the study area that would be reserved for future industrial expansion and other community uses.

Examples of other community uses in the study area:

In the northeast portion of area 3C the community has proposed the expansion of existing sports facilities that may consume over 100 acres and the expansion of the existing residential and commercial areas in Old Squamish should also be anticipated. If maximum industrial growth is desired some ecological reserves will still be desirable.

As indicated in the area data, Squamish District contains over 26,000 acres of which the 5,700 acres in the study area is a minor portion. Much of the total land area in the Squamish District

is not suitable for development, but there is ample land for all other user demands to permit the growth of the industrial area to at least 1,000 acres while maintaining the existing style of low density housing and high level of support commercial and community facilities.

7. COMPARATIVE REGIONAL CONSIDERATIONS

Although this subject may be dealt with in other aspects of the study by more qualified experts, the comparative advantages and disadvantages of Squamish as a port facility and industrial centre are important considerations in the estimation of land values. Considering the combination of railroad facilities, flat land for development and deep water moorage capacity, there are relatively few areas of British Columbia that offer the potential for port facilities and industrial back-up land for development. These are the Fraser-Delta, and Kitimat-Delta, Prince Rupert and the Squamish-Delta. The areas of Vancouver Island are excluded from that list because they do not offer rail access to the hinterland of the country. There are many other areas of the province that offer one or two out of the three features and, if rail can be extended to them economically in the future, they might also compete with the Squamish area and other existing port areas.

The planned development of Prince Rupert and expansion of Roberts Bank as bulk loading ports will reduce demands for the use of Squamish in that way. Prince Rupert has a geographic advantage with regard to the Japanese market by substantially reducing sailing time. All sources interviewed during the course of this study have indicated that this shorter sailing time, and good direct rail access to Prince Rupert from the Canadian Prairies and the B.C. North, give that port a marked advantage in the shipment of bulk grain and coal, and in some forest products and other minerals destined for the Japanese market.

However, it has been pointed out that the Japanese market is not the exclusive market for British Columbia products and that the Port of Vancouver, Delta and the Squamish area have an advantage for European destinations utilizing the Panama Canal and for U.S.A. and Central and South American shipments. Development of new forest product mills along the existing B.C. Railway route would appear to require the addition of assembly wharfage either in Squamish or the Port of Vancouver. As Squamish is the shorter haul route, it would appear logical that products shipped from the Interior of British Columbia via B.C.R. would have an advantage in being shipped from Squamish. However, there is no present freight rate advantage for cars with a Squamish destination.

Other factors that could influence the future volume and type of materials shipped from Squamish include an Ashcroft rail link with C.N. or C.P. Rail and a possible natural gas main line to the area. However, the former appears to have been delayed indefinitely at the political level and the latter depends upon selection of the northern route option for natural gas service to Vancouver Island. To place any limit on the potential users and usage of industrial lands in this area, or any other Port area of coastal British Columbia because of any present or reasonably forseeable economic trends or resource development, would be short sighted. The ultimate restriction on the future usage of this area is the constraint of the limited land area that can be economically developed.

The Squamish area will then, in my opinion, be developed in competition with the Port of Vancouver, ports along the Fraser River, Kitimat and Prince Rupert. Of a more local nature, it should be pointed out that there is 150 acres in the Britannia Beach area that is suitable for all of the same uses as the Squamish Estuary. It is also served by B.C. Rail and provides an alternate competing site for a portion of the development that could ultimately occur in Squamish.

APPENDIX IV

APPENDIX IV

INTRODUCTORY ECONOMICS OF INDUSTRIAL/COMMERCIAL LAND MARKETS

1. Introduction

This appendix is intended as an introduction to the economic methodology that underlies the Land Use Work Group Final Report and is aimed at those readers who are unfamiliar with economics. The appendix contains a general description of the economic workings of a competitive market, with specific reference to industrial land markets. Two economic concepts are developed: 1. the market; and, 2. industrial land as an input into a production process. These two concepts are then brought together in a discussion of the economic factors that determine the pattern of industrial land use.

2. The Market

2.1 Markets in Theory and in Reality

The concept of a market that is used in economic analysis is a simplified version of the real markets within which individuals in an economy purchase and sell goods and services. The theoretical market, or market model, is an abstraction incorporating only a few of the important economic factors that exist in the complex real markets. The market model serves to

isolate these factors so that they may be better understood. In this section a very simple market model is developed and the concepts of supply and demand are explained.

A market is the context within which individuals voluntarily exchange a particular commodity. The commodity may be any good or service people will buy, for example, industrial land, Japanese Yen, tomatoes, Canadian Savings Bonds, a shoe-shine, or tractors. It is assumed that there is a well-functioning competitive market for every possible good or service.

2.2 Demand

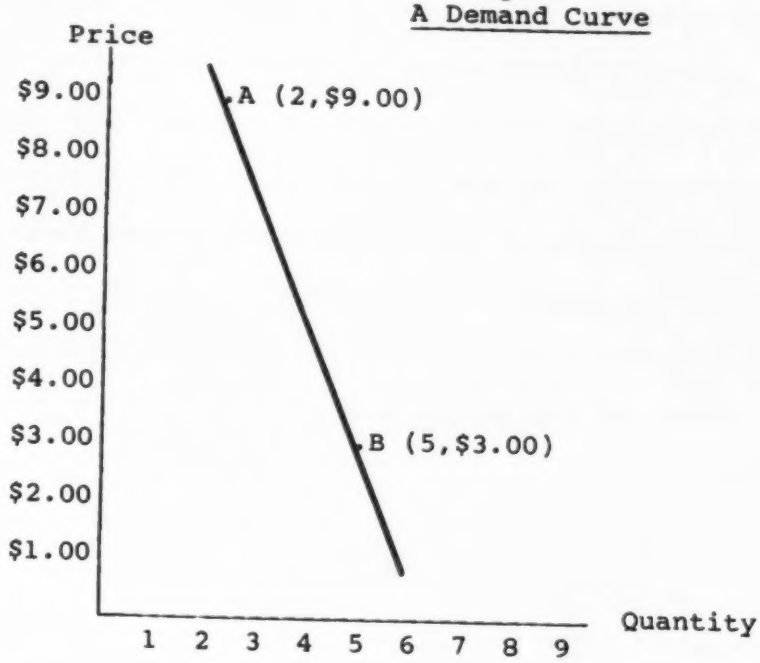
Some of the individuals who come to trade in the market wish to purchase the commodity. The wishes of these potential purchasers (how much of the commodity they would like to buy at each conceivable price) can be diagrammed, as in Figure 1, by a geometric line called a demand curve.

The position and shape of the curve reflects many economic factors, in particular the tastes of purchasers, population, average income, distribution of income, the price of the commodity and the prices of other complementary and substitute commodities.

Notice that the demand curve slopes downward to the right because at a higher price (like $9.00), individuals will generally

want to buy less of the commodity (say two units) resulting in point A on the demand curve, whereas at a lower price (such as $3.00) individuals will generally wish to buy a larger volume of the commodity (like five units) so that a price-quantity combination such as point B is on the demand curve.

Figure 1
A Demand Curve



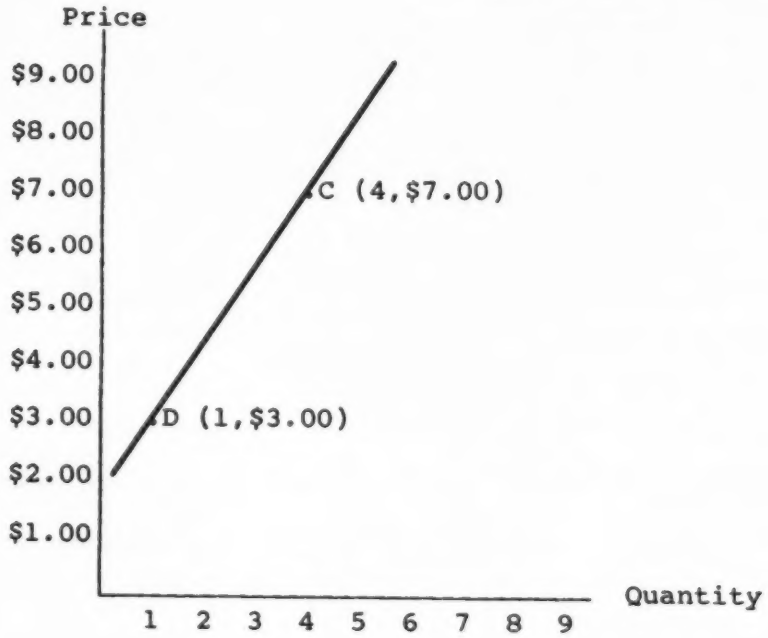
2.3 Supply

Other individuals in the market offer supplies of the commodity for sale. The wishes of these potential sellers (how much of the commodity they would like to sell at each conceivable price) is shown by another geometric line, shown in Figure 2, called a supply curve.

The position and shape of the curve is primarily determined by the following economic factors: the goals of sellers (e.g. profit maximization), technology, prices of complementary and substitute commodities, and the prices of inputs used to produce the commodity.

The supply schedule slopes upward to the right because individuals will generally want to put a large amount of their commodity (like four units) on the market if prices are high (like 4 units at $7.00 at point C). At low prices (like $3.00) sellers will be reluctant to offer much of the commodity for sale (perhaps only one unit) resulting in point D on the supply curve.

Figure 2
A Supply Curve

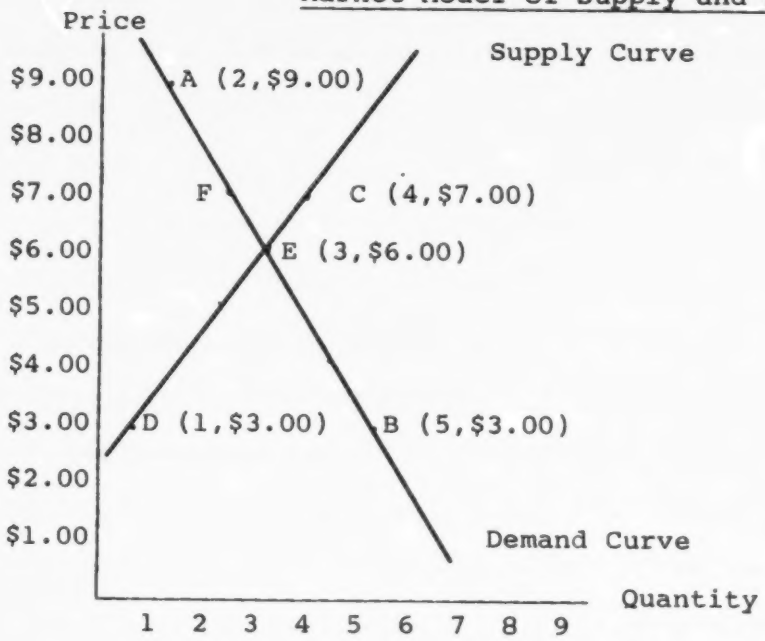


2.4 Completing the Market Model

Putting supply and demand together in Figure 3 completes the simple market model. Notice that the two lines cross at a single point, E. This point is referred to by economists as the equilibrium price and quantity sold in the market. It is called an equilibrium because at that price and quantity combination, both buyers and sellers are satisfied with their transactions. Hence there is no tendency to change either the price ($6.00) or quantity (three units) of the commodity that is bought and sold. Note that point C is not an equilibrium point because at that point sellers offer four units at $7.00 per unit while buyers will wish to purchase fewer than three units of the commodity at that price, shown by point F. An excess supply of the commodity will exist equal to approximately two units. Likewise at point B, given a price of $3 per unit, buyers would like to buy a large amount of the commodity (five units). However, sellers are only willing to sell one unit for such a low price, represented by point D. Thus, excess demand exists equal to four units. Only at point E will neither excess supply or demand exist, and both sellers and buyers be content with the price and quantity of the commodity transacted. Moreover, the equilibrium price and quantity tends to prevail in the market, and thus it is usually referred to as simply the market price and quantity.

Figure 3

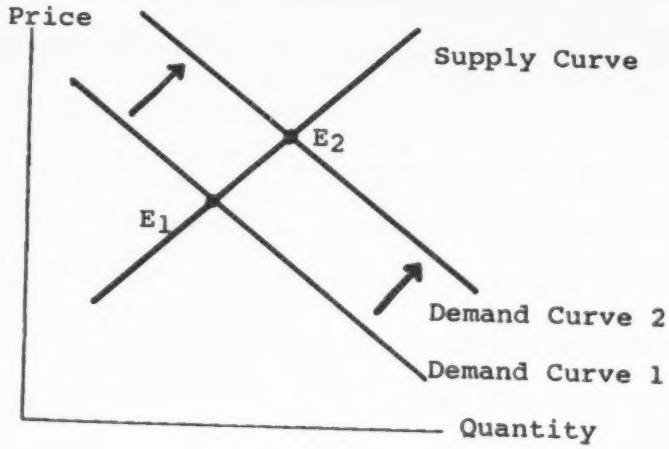
Market Model of Supply and Demand



It may happen that, due to a change in one of the economic factors which affect the position and shape of the demand (or supply) curve, the entire demand (or supply) curve will shift. For example, as shown in Figure 4, the demand curve may shift to the right due to an increase in the incomes of purchasers of the commodity. Note that at each possible price, more of the commodity is demanded. All other things being equal, this increase in demand will cause a new equilibrium price and quantity combination (represented by E_2) to prevail at a higher price and greater

Figure 4

Shift in a Demand Curve



quantity. Shifts in the demand curve to the left may also occur. Similar market reactions hold for shifts in the supply curve.

3. The Market for a Production Input - Industrial Land[1]

3.1 Inputs

The market model can be used to analyse the effect of changes in economic factors on the prices and quantities of land that is bought and sold. Land, however, is one of a group of special commodities which may be used as inputs in a production

[1] This section is derived from Richard G. Lipsey, Gordon, R. Sparks, and Peter O. Steiner (1973) Economics (New York: Harper & Row Publishers), Part Four, "Production and Cost". This introductory economics text-book contains an excellent bibliography which is recommended for those readers desiring more information on economic theory and topics.

process to create other commodities called final goods and services. The market model for an input differs from that for other commodities in that the demand for an input is dependent on an additional economic factor, namely the demand for the final commodities that the input is used to produce. For example, as more leather products such as shoes, handbags, and coats are purchased, the demand for raw leather likewise increases.

Production inputs are usually grouped into one of four categories: land; labour; capital (machinery and equipment); and materials (other commodities, including energy). Land inputs may be subdivided into sub-categories according to the use to which the land is put, since each land use represents a distinctly different input.

The manager of a production plant combines the four inputs to produce the final commodity(s) using the method of production that he has determined to be the most economically efficient (i.e. the least cost and, therefore, the profit-maximizing production process), given the available production technology and the prices of the required inputs.

3.2 Principle of Substitution of Inputs

The manager's choice of the method of production is influenced by changes in the relative prices (costs) of inputs. Suppose the cost of labour increases while the cost of land remains

unchanged. The least-cost method of producing any output will now use less labour and more land than was used previously. Assuming that firms try to minimize costs in order to maximize profits, the following prediction holds:

> Methods of production will tend to change if the relative prices of inputs change. Relatively more of the cheaper input and relatively less of the more expensive one will be used.

This prediction is called the principle of substitution of inputs. Its importance for the economy arises because the relative prices of inputs reflect their scarcity in relation to the demand for them. Abundant inputs have prices that are low relative to the prices of scarce inputs.

On the supply side, changes in the relative prices of inputs will draw out increased supplies of the scarce input. As the price of a scarce input rises, the producers of that input will be encouraged to increase production since they now expect to receive a greater price per unit.

This discussion provides an example of the market system as an automatic control device. No single manager needs to be aware of national surpluses and scarcities of production inputs. Prices are determined in the input markets by the interaction of

supply and demand and, thus, tend to reflect the surpluses and scarcities of these inputs. Individual managers who never look beyond their own private profit are nonetheless led to economize on inputs that are scarce to the nation as a whole. In effect, price acts as a signal of the relative scarcity of commodities, such as industrial land.

3.3 An Example - Industrial Land

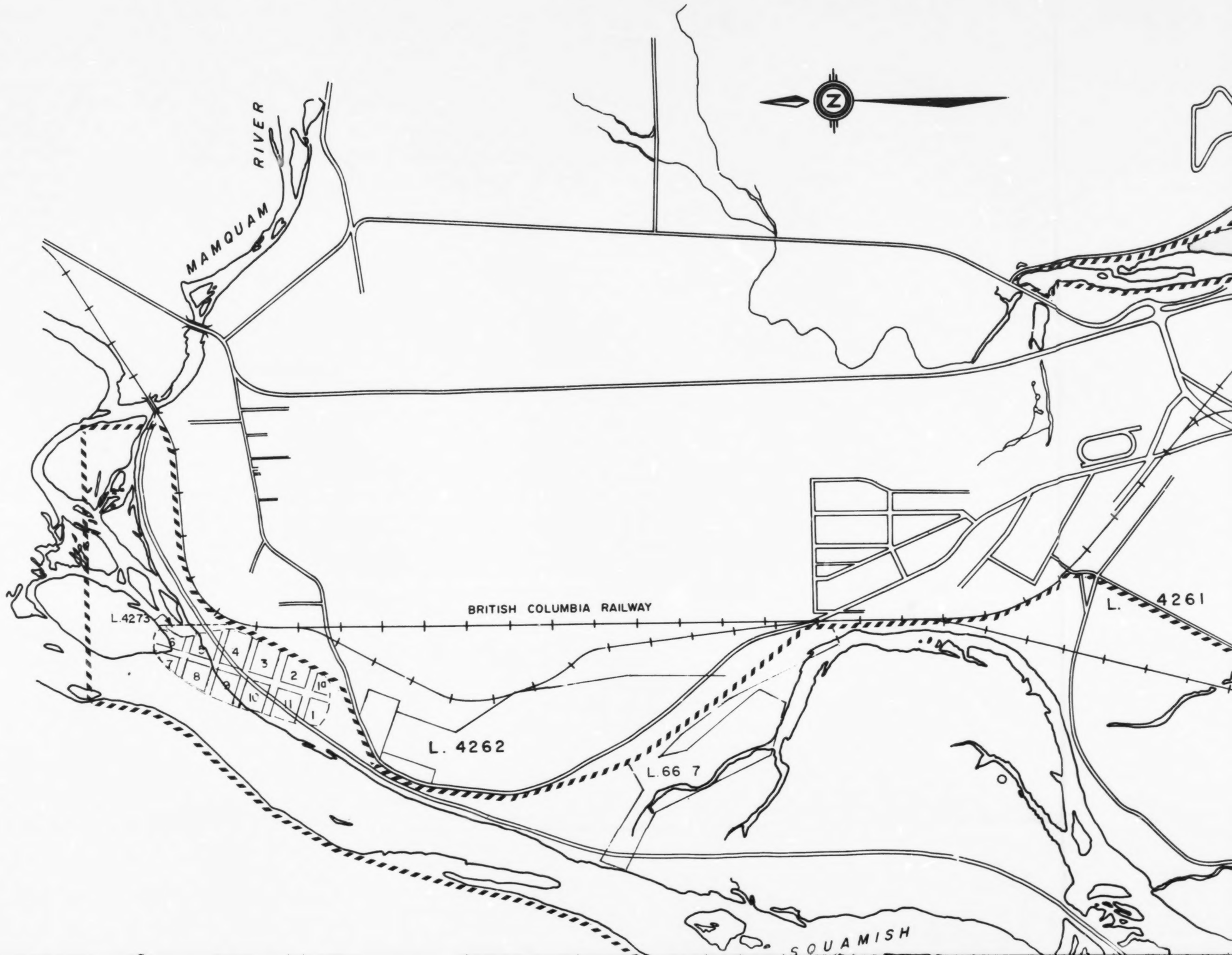
The interactions of the economic factors that determine land use patterns may be best understood by investigating the impact of a change in relative prices in the economy on a particular land market. Assume that there is a significant surge in demand for the final commodities that industrial land may be used to produce. This has the effect of increasing the derived demand for industrial land. Thus at each possible price, there is a greater volume of industrial land demanded. Owners of land that is currently used for industrial purposes, and owners of land that may be developed as industrial land, will re-evaluate their land investment in view of the new higher set of industrial land prices. Like any investor, land owners will seek to obtain the greatest possible net return (revenues net of costs). In particular, the higher price of idustrial land may induce owners of land currently in other uses to offer it on the industrial land market. Some investment may be required to turn the land into industrial land, but the land owner is likely to make this additional investment if he expects to make a net return, i.e., if

the price increase per unit of industrial land is greater than the cost per unit to develop it.

Production plant managers who currently use industrial land for their production processes will try, in view of the higher price, to reduce the amount of industrial land that they utilize. In the short run, this may be done by substituting other inputs for land and perhaps selling or leasing a portion of their plant site. In the longer run, which allows for the planning of new production plants, the plant manager may shut the plant down, move the plant to another location which has lower industrial land prices but may have higher costs for other inputs like labour and transportation, or continue to use the same plant site but use proportionately more of the other inputs relative to the amount of land utilized. The quantity of industrial land input that is used in the economy will be exactly the amount warranted by the value of the final goods and services that the land is used to produce. The resulting pattern of land use will be one in which there has been a shift away from the use of industrial land and towards the use of other substitute inputs, as compared to before the increase in demand for final commodities from industries.

The above scenario is based on a theoretical market model which is designed to illuminate discrete shifts from one static market equilibrium to another. In the real world, however, the market equilibrium continually changes due to perpetual changes in an infinite number of economic factors affecting supply and

demand. As a result, managers are unable to determine their future production strategies with any degree of accuracy or certainty. Rather, managers must plan their firm's future production activity by taking into account an element of risk that is associated with their expectations regarding such decision variables as future prices, costs and technology.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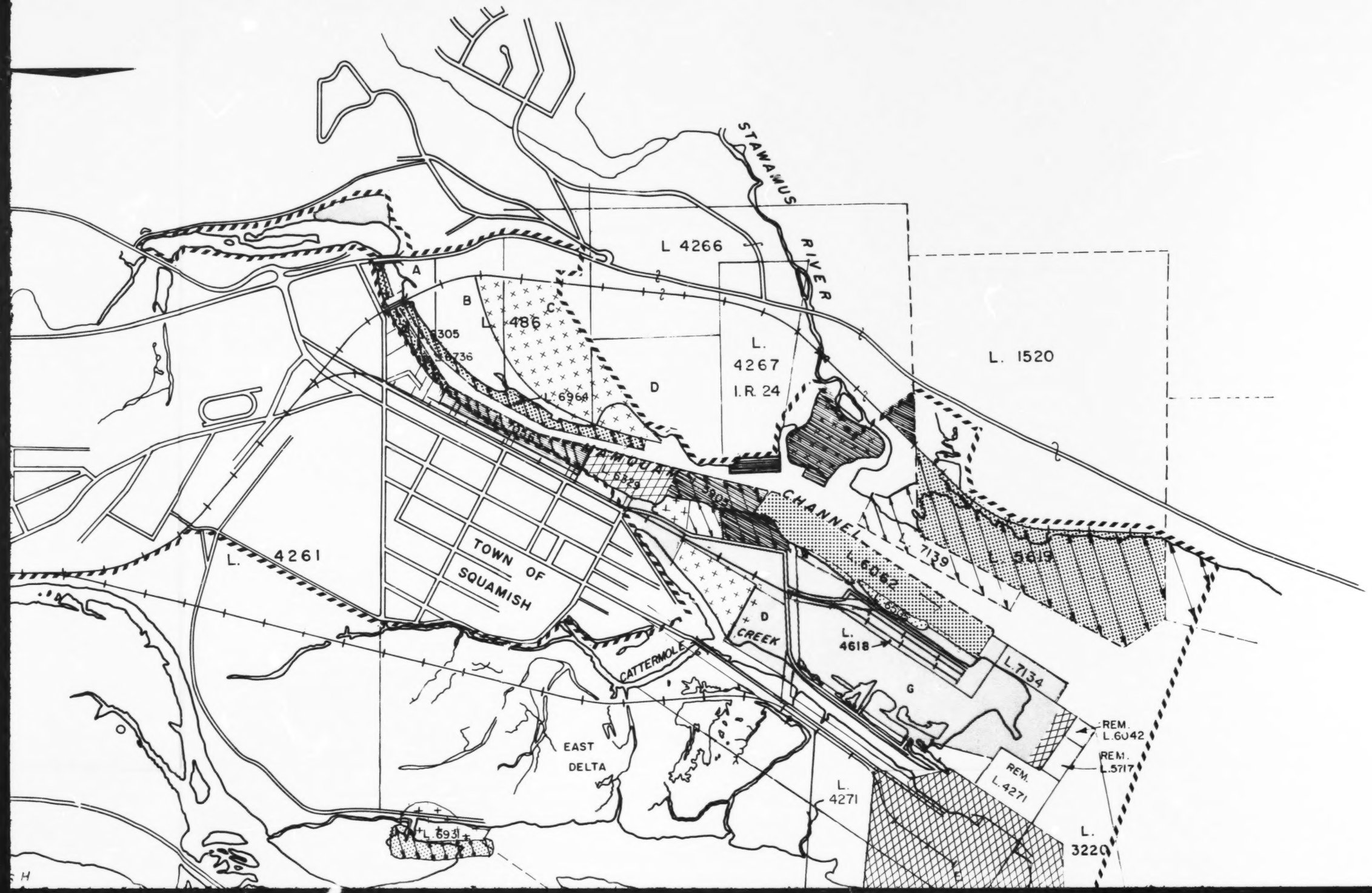
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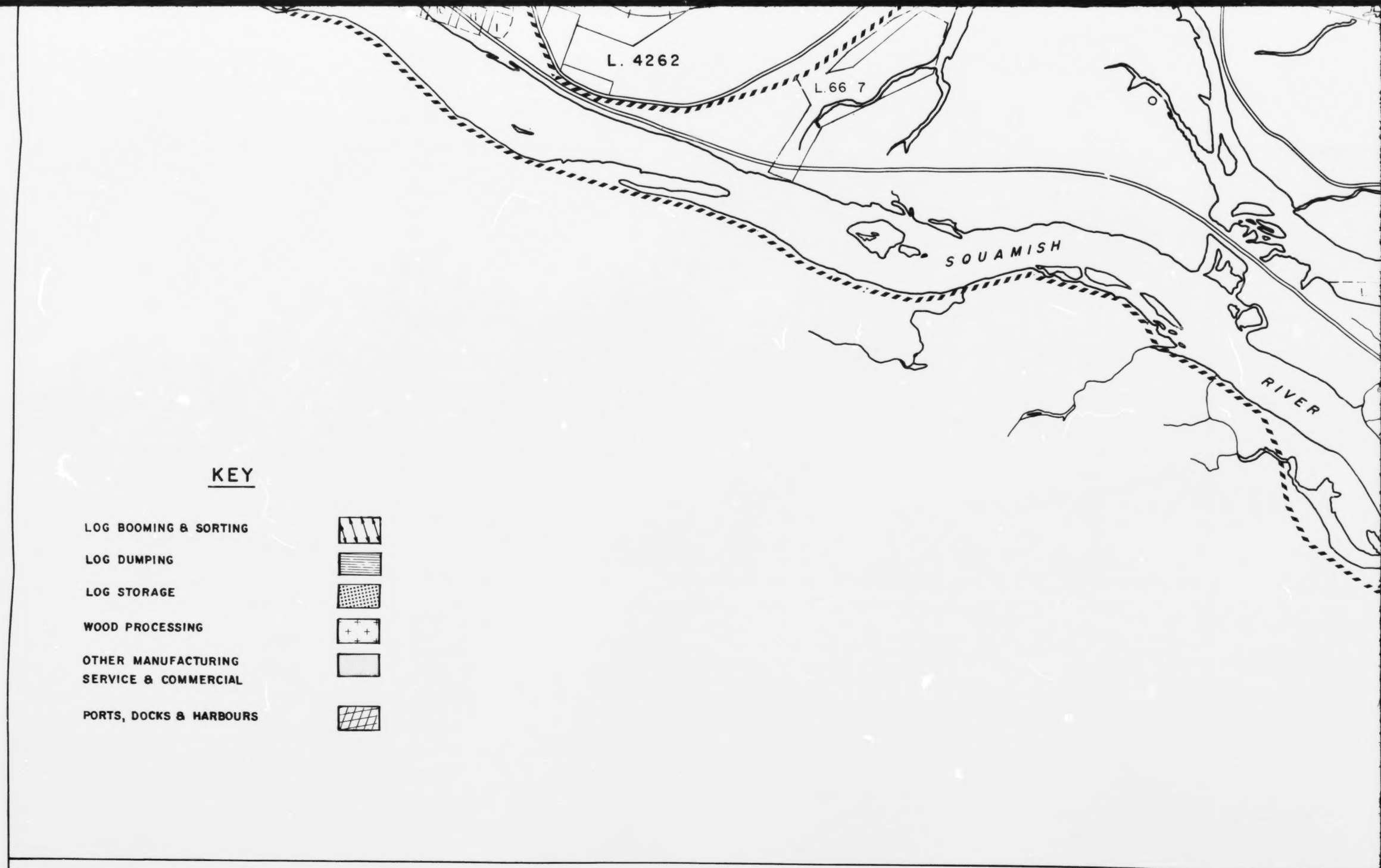


LAND USE MAP (February, 1981)

Sources: Ministry of Lands, Parks a
and Interwest Property S

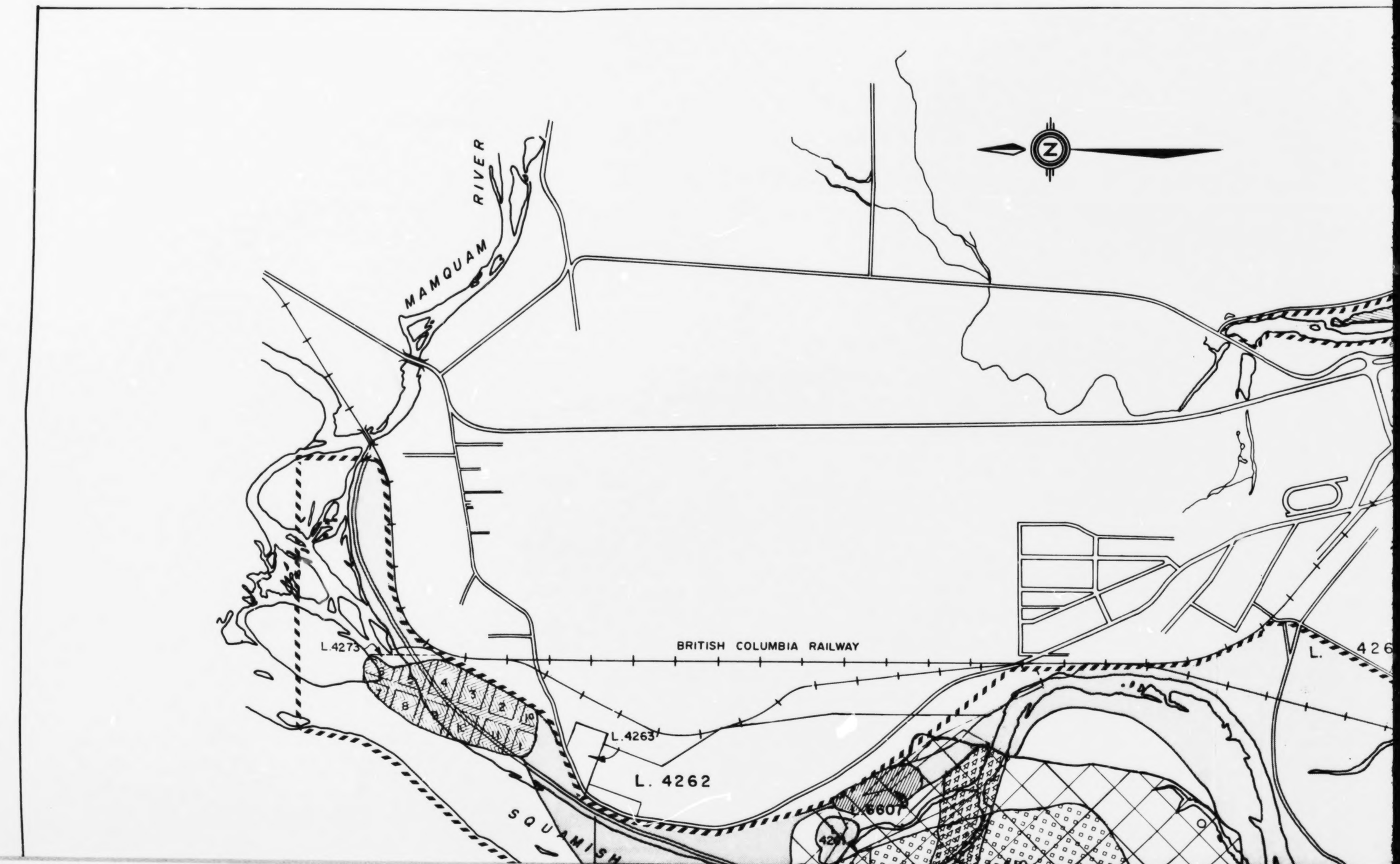
Sources: Ministry of Lands, Parks and Housing and Interwest Property Services, Ltd.

Province of British Columbia — Ministry of Environment

Prepared by: Ministry of Industry & Small Business Development

SQUAMISH ESTUARY MANAGEMENT PLAN STUDY AREA

MAP III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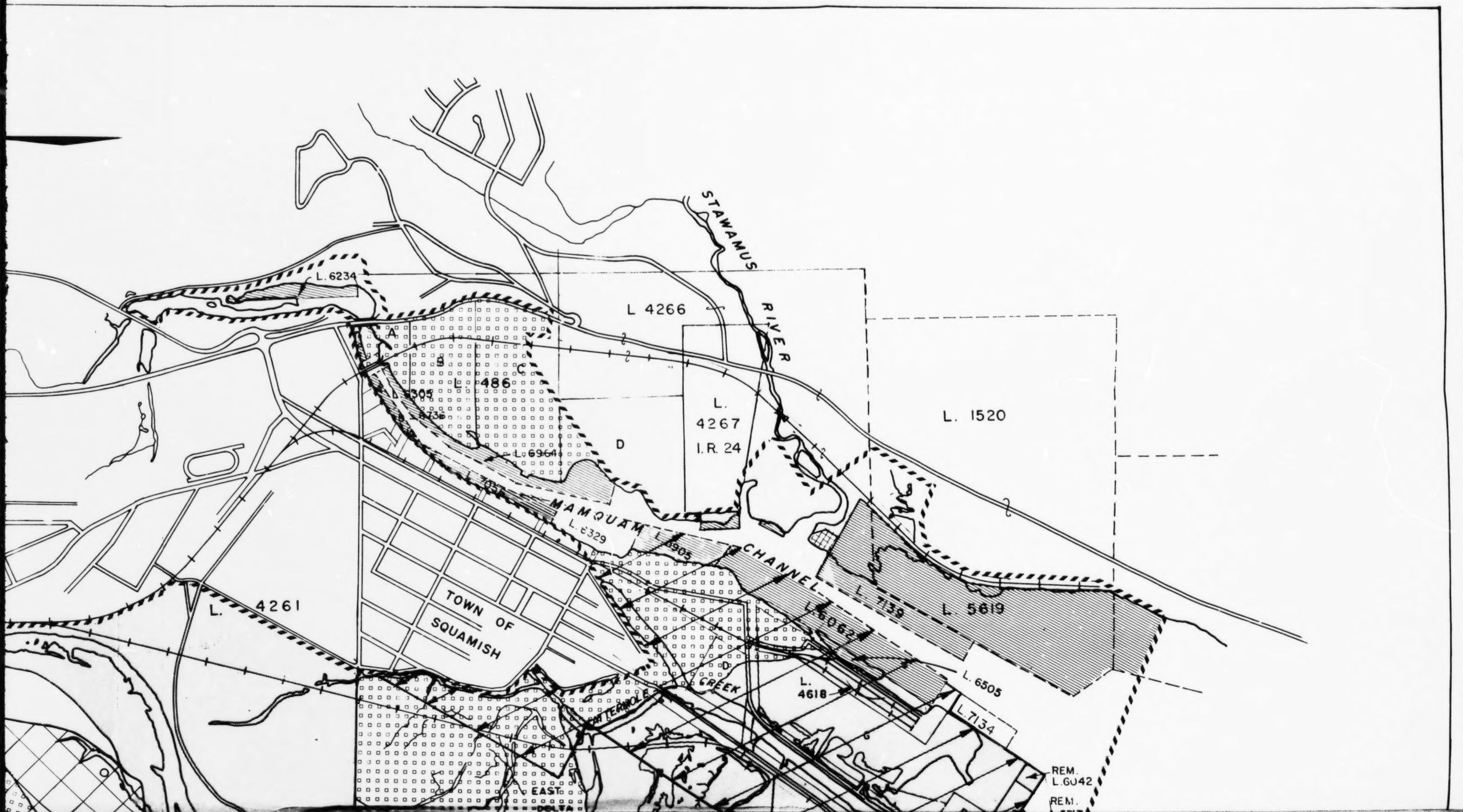
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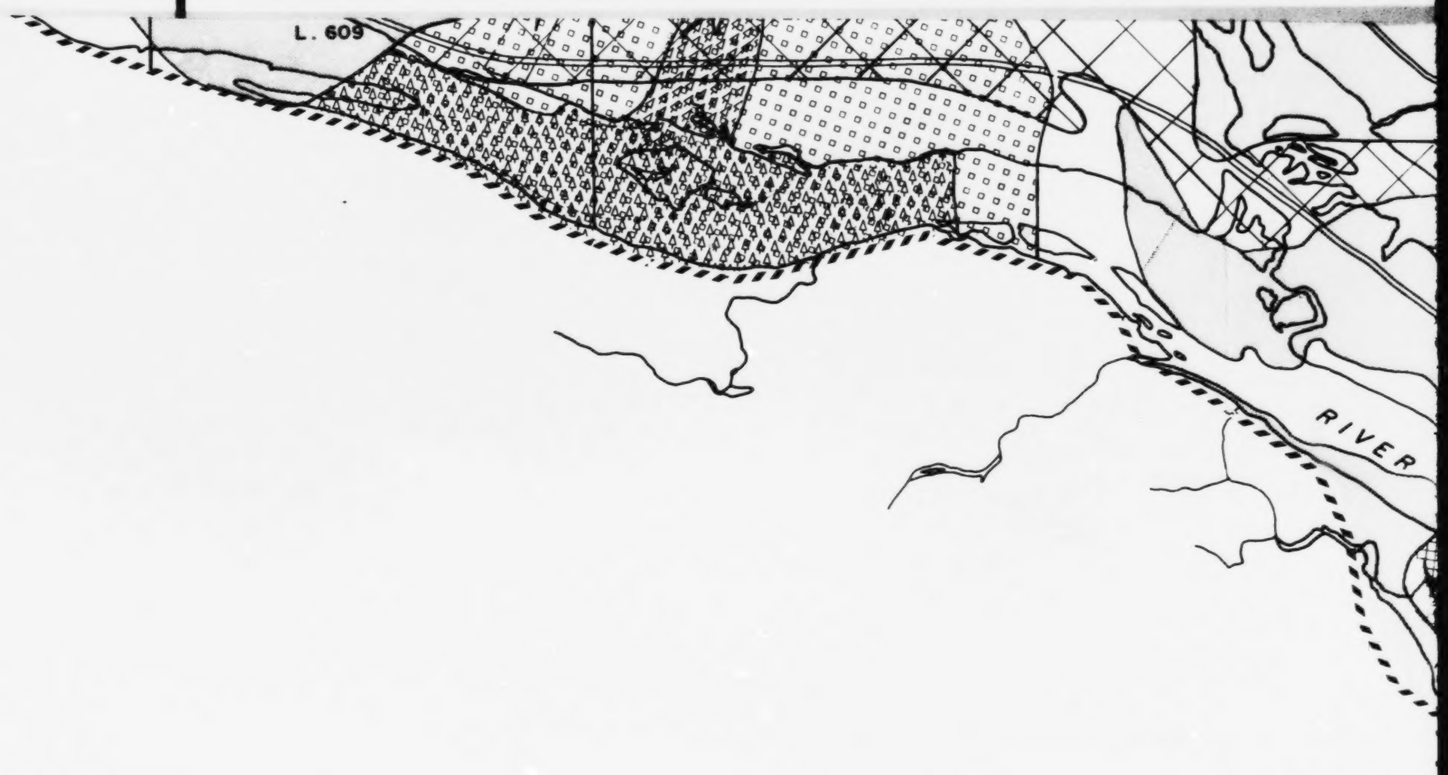


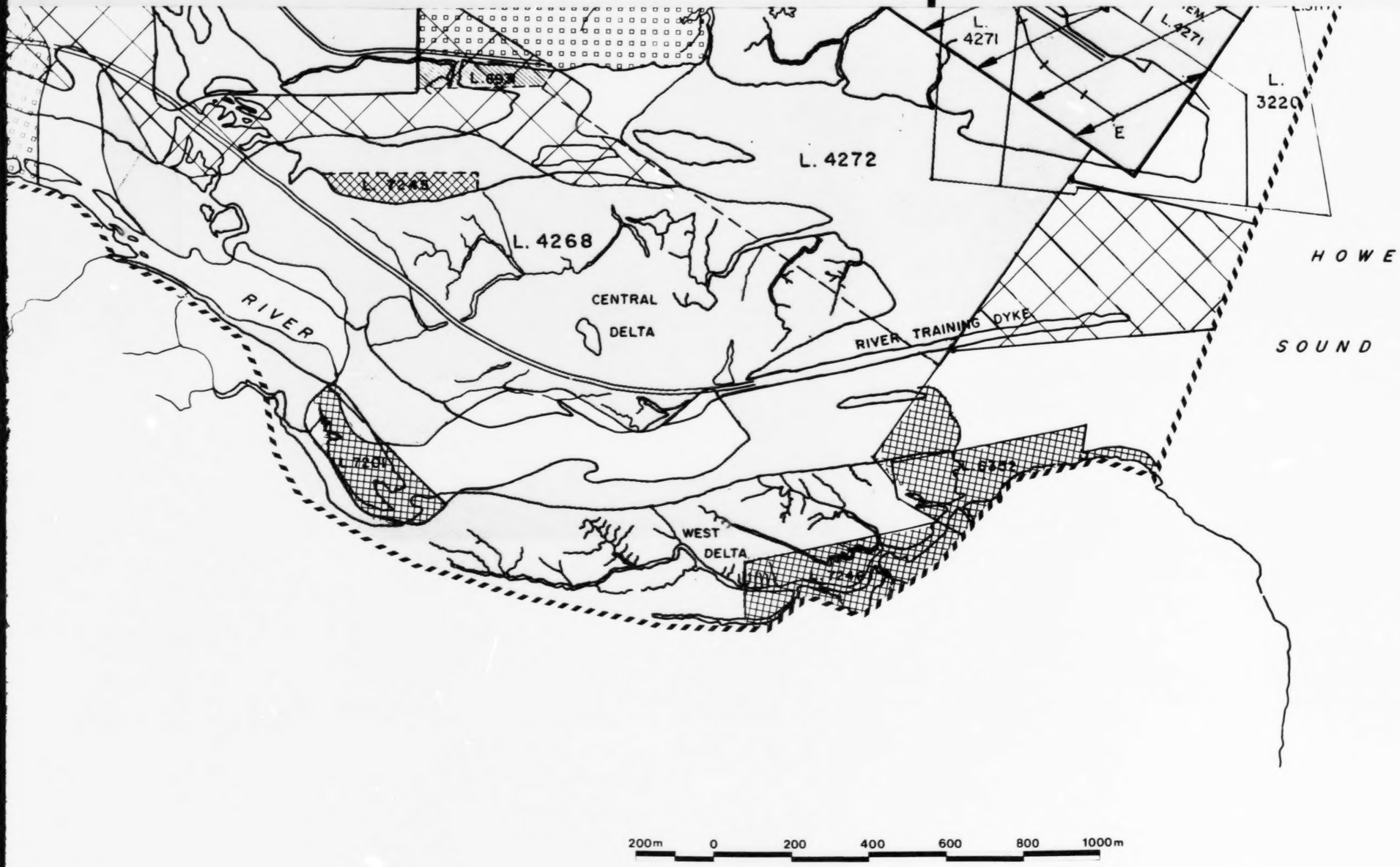
KEY

- CROWN LAND UNDER LEASE
- P.G.E. RLY. RESERVE
- CROWN LAND RESERVED FROM ALIENATION
- B.C.R. LAND
- VACANT SURVEYED CROWN LAND
- APPLICATION FOR FREE CROWN GRANT BY B.C. RLY. CO. FOR INDUSTRIAL DEVELOPMENT PURPOSES
- TIMBER SALE
- SUBDIVIDED, SOME CROWN & SOME PRIVATE
- VACANT UNSURVEYED CROWN LAND

LEASE STATUS MAP (February, 1981)

Sources: Ministry of Lands, Parks and Housing and Interwest Property Services, Ltd.

Note: L. 6329 is reserved for public works, Canada



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Province of British Columbia Ministry of Environment

Prepared by: Ministry of Industry and Small Business Development

SQUAMISH ESTUARY MANAGEMENT PLAN STUDY AREA

MAP II